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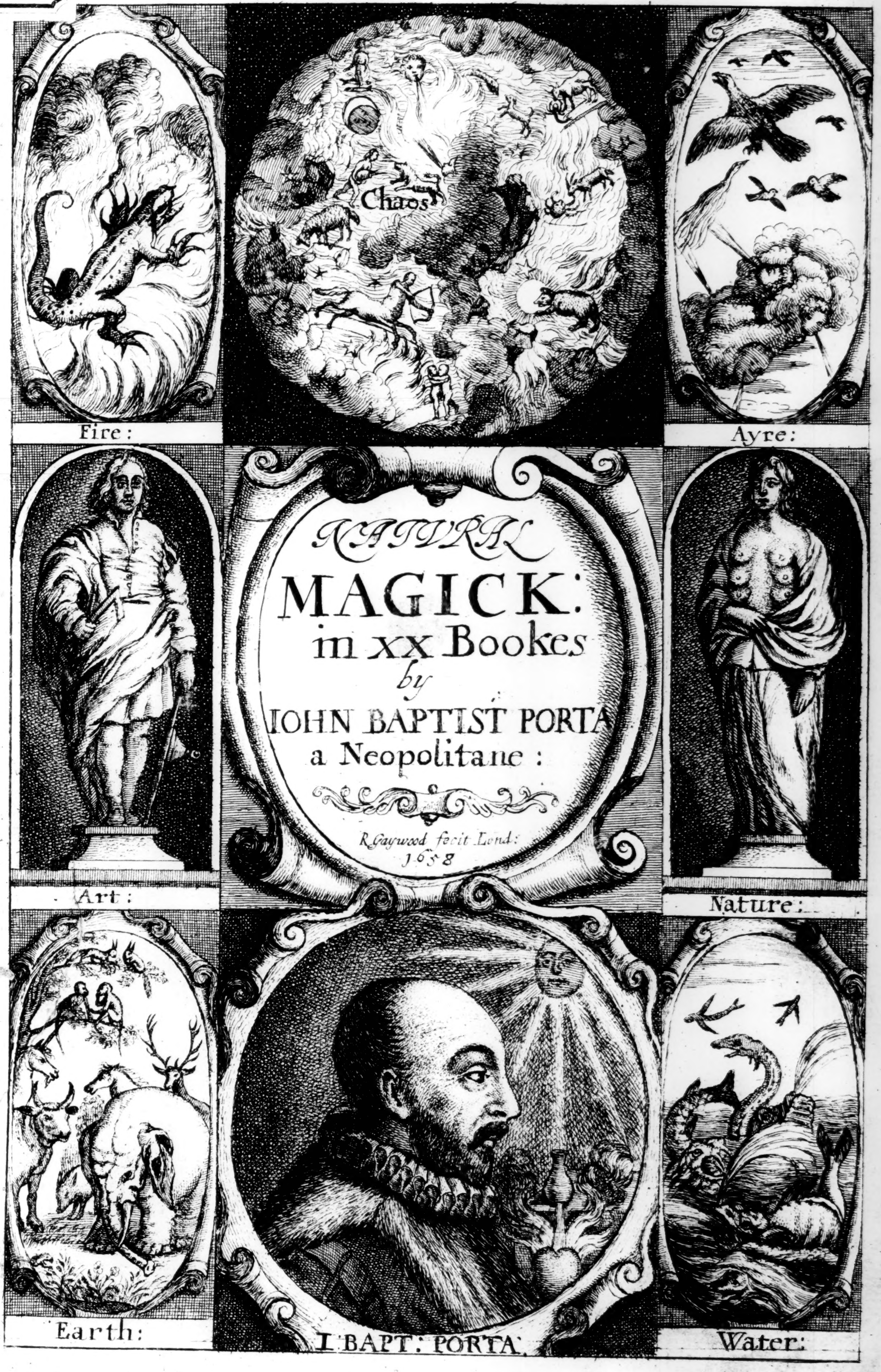
Chaos
Fire:
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NATURAL
MAGICK:
in XX Bookes
by
IOHN BAPTIST PORTA
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1658
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Water:

Wm Richardson

NATURAL MAGICK

BY

John Baptista Porta,

A NEAPOLITANE:

IN

TWENTY BOOKS:

1 Of the Causes of Wonderful things.
2 Of the Generation of Animals.
3 Of the Production of new Plants.
4 Of increasing Houshold-Stuff.
5 Of changing Metals.
6 Of counterfeiting Gold.
7 Of the Wonders of the Load-stone.
8 Of strange Cures.
9 Of Beautifying Women.
10 Of Distillation.
11 Of Perfuming.
12 Of Artificial Fires.
13 Of Tempering Steel.
14 Of Cookery.
15 Of Fishing, Fowling, Hunting, *&c.*
16 Of Invisible Writing.
17 Of Strange Glasses.
18 Of Statick Experiments.
19 Of Pneumatick Experiments.
20 Of the Chaos.

A methodical table see at ye end of ye books & chapters as they ly.

Wherein are set forth

All the RICHES and DELIGHTS

Of the

NATURAL SCIENCES.

Joh. Leslie

LONDON,

Printed for *Thomas Young*, and *Samuel Speed*; and are to be sold at the three Pigeons, and at the Angel in St. *Paul's* Church-yard. 1658.

The Preface to the Reader.

Courteous Reader,

IF *this Work made by me in my Youth, when I was hardly fifteen years old, was so generally received and with so great applause, that it was forthwith translated into many Languages, as* Italian, French, Spanish, Arabick; *and passed through the hands of incomparable men: I hope that now coming forth from me that am fifty years old, it shall be more dearly entertained. For when I saw the first fruits of my Labours received with so great Alacrity of mind, I was moved by these good Omens; And therefore have adventured to send it once more forth, but with an Equipage more Rich and Noble.*

From the first time it appeared, it is now thirty five years, And (without any derogation from my Modesty be it spoken) if ever any man laboured earnestly to disclose the secrets of Nature, it was I: For with all my Minde and Power, I have turned over the Monuments of our Ancestors, and if they writ any thing that was secret and concealed, that I enrolled in my Catalogue of Rarities. Moreover, as I travelled through France, Italy, *and* Spain, *I consulted with all Libraries, Learned men, and Artificers, that if they knew any thing that was curious, I might understand such Truths as they had proved by their long experience. Those places and men, I had not the happiness to see, I writ Letters to, frequently, earnestly desiring them to furnish me with those Secrets, which they esteemed Rare; not failing with my Entreaties, Gifts, Commutations, Art, and Industry. So that whatsoever was Notable, and to be desired through the whole World, for Curiosities and Excellent Things, I have abundantly found out, and therewith Beautified and Augmented these, my Endeavours, in* NATURAL MAGICK, *wherefore by most earnest Study, and constant Experience, I did both night and day endeavour to know whether what I heard or read, was true or false, that I might leave nothing unassayed: for I oft thought of that Sentence of* Cicero, It is fit that they who desire for the good of mankinde, to commit to memory things most profitable, well weighed and approved, should make tryal of all things. *To do this I have spared no Pain nor Cost, but have expended my narrow Fortunes in a large magnificence.*

Nor were the Labours, Diligence, and Wealth, of most famous Nobles, Potentates, Great and Learned Men, wanting to assist me; Especially (whom I name for his Honour) the Illustrious and most Reverend Cardinal of Estings: *All which did afford their Voluntary and Bountiful Help to this Work. I never wanted also at*

my House an Academy of curious Men, who for the trying of these Experiments, chearfully disbursed their Moneys, and employed their utmost Endeavours, in assisting me to Compile and Enlarge this Volume, which with so great Charge, Labour, and Study, I had long before provided.

Having made an end thereof, I was somewhat unwilling to suffer it to appear to the publike View of all Men (I being now old, and trussing up my Fardel) for there are many most excellent Things fit for the Worthiest Nobles, which should ignorant men (that were never bred up in the sacred Principles of Philosophy) come to know, they would grow contemptible, and be undervalued; As Plato *saith, to* Dionysius, They seem to make Philosophy ridiculous, who endeavour to prostitute Her Excellence to prophane and illiterate Men.

Also here are conceived many hurtful and mischievous things, wherewith wicked and untoward men may mischief others; What then must I do? let Envy be driven away, and a desire to benefit Posterity, vanquish all other thoughts: The most Majestick Wonders of Nature are not to be concealed, that in them we may admire the Mighty Power of God, his wisdom, his Bounty, and therein Reverence and Adore him. Whatsoever these are, I set them before you, that you may discern my Diligence and Benevolence towards you; Had I withheld these Things from the World, I fear I should have undergone the reproach of a wicked man; for (Cicero *derives this from* Plato) we are not born for our selves alone, but our Countrey will challenge a part, our Parents and our Friends require their parts also from us. *Wherefore such Things as hitherto lay hid in the Bosome of wondrous Nature, shall come to light, from the Store-houses of the most ingenious Men, without fraud, or deceit.*

I Discover those Things that have been long hid, either by the Envy or Ignorance of others, Nor shall you here finde empty Trifles, or Riddles, or bare Authorities of other men.

I did not think fit to omit any thing by erring Honestly, or following the best Leaders, But such as are Magnificent and most Excellent, I have veil'd by the Artifice of Words, by Transposition and Depression of them; And such Things as are hurtful and mischievous, I have written obscurely; yet not so, but that an ingenious Reader may unfold it, and the wit of one that will throughly search may comprehend it.

I have added some things that are Profitable, and rarely Known, because they are most true. Sometimes from Things most Known, and meanly esteemed, we ascend to Things most Profitable and High, which the Minde can scarce reach unto: One's Understanding cannot comprehend High and Sublime Things, unless it stand firm on most true Principles. The Mathematical Sciences, rise from some trivial and common Axioms, to most Sublime Demonstrations. Wherefore I thought it better to Write true Things and Profitable, than false Things that are great. True Things be they never so small, will give occasions to Discover greater things by them. The infinite multitude of Things is incomprehensible, and more than a man may be able to contemplate.

In our Method I shall observe what our Ancestors have said; Then I shall shew by my own Experience, whether they be true or false, and last of all my own Inventions, That Learned Men may see how exceedingly this later Age hath surpassed Antiquity.

Many men have written what they never saw, nor did they know the Simples that were the Ingredients, but they set them down from other mens traditions, by an inbred and importunate desire to adde something, so Errors are propagated by succession, and at last grow infinite, that not so much as the Prints of the former remain.

That

That not onely the Experiment will be difficult, but a man can hardly reade them without laughter.

Moreover, I pass by many men, who have written Wonders to be delivered to Posterity, promising Golden Mountains, yet Write otherwise then they thought. Hence most ingenious men, and desirous to learn, are detained for a very long time (and when they despair of obtaining what they seek for, they finde that they spent their time, pains, and charge in vain) and so driven to desparation, they are forced to repent by leisure: Others grown wise by other mens harms, learn to hate those Things before they know them.

I have divided these Secrets into several Classes, that every man may finde what he likes best.

Lastly, I should willingly pass by the offending of your Ears, if I had no care to refell the Calumnies of detractors and envious men, that most immodestly wound me, calling me a Sorcerer, a Conjurer, which names from my tender Youth I have abhorr'd. Indeed I always held my self to be a man subject to Errors and Infirmities; therefore desired the assistances of many Learned men, and that if I had not faithfully interpreted, they would reprove me; But what I always feared came to pass, that I should fall into the hands of some vile and hateful men, who by doing injury to others, justly or unjustly, labour to win the popular and base Approbation, and Applause of the Vulgar, by whose venom'd Teeth, those that are wounded do not consume, but by retorting the venome back upon them, they overthrow their own Honor.

A certain Frenchman in his Book called Dæmonomania, *Tearms me a Magician, a Conjurer, and thinks this Book of mine, long since Printed, worthy to be burnt, because I have written the Fairies Oyntment, which I set forth onely in detestation of the frauds of Divels and Witches; That which comes by Nature is abused by their superstition, which I borrowed from the Books of the most commendable Divines. What have I offended herein, that they should call me a Conjurer? But when I enquired of many Noble and Learned Frenchmen, that were pleased to Honour me with their Visits, what that man was, they answered that he was an Heretick, and that he had escaped from being cast headlong from a Tower, upon Saint* Bartholomew *his day, which is the time appointed for the destruction of such wicked men. In the mean time I shall desire the great and good God (as it becomes a Noble and Christian man to do) that he may be converted to the Catholike Faith, and may not be condemned whilst he lives.*

Another Frenchman who unworthily reviled all the Learned men of his Age, joyns me amongst them, and holds, that onely three Physitians, that are his Friends, are Praise-worthy, as the most Learned of all men of our Times; and amongst them he reckons up himself; for the Book is published in his Name, it is a wonder what Inventions that man hath found out to win praise, who having no man to commend him, nor is he worthy commendations, yet he hath undertaken to commend himself. I pass over other men of the same temper, who affirm that I am a Witch and a Conjurer, whereas I never Writ here nor elswhere, what is not contain'd within the bounds of Nature.

Wherefore, Studious Readers, accept my long Labours, that cost me much Study, Travel, Expence, and much Inconvenience, with the same Minde that I publish them; and remove all Blindness and Malice, which are wont to dazle the sight of the Minde, and hinder the Truth; weigh these Things with a right Judgement, when you try what I have Written, for finding both Truth and Profit, you will (it may be) think better of my Pains. Yet I am assured there will be many ignorant people, void of all serious Matters, that will Hate and Envy these Things, and

will Rashly pronounce, That some of these Experiments are not only false, but impossible to be done; And whilst they strive by Arguments and vain Disputes, to overthrow the Truth, they betray their own ignorance: Such men, as vile, are to be driven from the Limits of our NATURAL MAGICK: *For they that believe not Natures Miracles, do, after a manner, endeavour to abolish Philosophy. If I have over-passed some Things, or not spoken so Properly of them, as I might; I know there is nothing so Beautiful, but it may be Adorned; Nor so Full, but it may be Augmented.*

J. B. P.

The

The FIRST BOOK OF Natural Magick:

Wherein are searched out the Causes of things which produce wonderful Effects.

Chap. I.

What is meant by the name of Magick.

Porphyry and *Apuleius*, great Platonicks, in an Oration made in the defence of Magick, do witness, that Magick took her name and original from Persia. *Tully*, in his book of Divination, saith, that in the Persian language, a Magician is nothing else but one that expounds and studies divine things; and it is the general name of Wise-men in that country. S. *Jerome* writing to *Paulinus*, saith that *Apollonius Tyanæus* was a Magician, as the people thought; or a Philosopher, as the Pythagoreans esteemed him. *Pliny* saith, that it is received for a certainty among most Authors, that Magick was begun in Persia by *Zoroastres* the son of *Orimasius*; or, as more curious Writers hold, by another *Zoroastres*, surnamed *Proconnesius*, who lived a little before. The first Author that ever wrote of Magick, was *Osthanes*, who going with *Xerxes* king of Persia in the war which he made against *Greece*, did scatter by the way as it were the seeds and first beginnings of this wonderful Art, infecting the world with it wheresoever he came; insomuch that the Grecians did not onely greedily desire this knowledge, but they were even mad after it. So then Magick is taken amongst all men for Wisdom, and the perfect knowledge of natural things: and those are called Magicians, whom the Latines call Wise-men, the Greeks call Philosophers, of *Pythagoras* onely, the first of that name, as *Diogenes* writes: the Indians call them Brackmans, in their own tongue; but in Greek they call them Gymnosophists, as much to say as naked Philosophers: the Babylonians and Assyrians call them Chaldeans, of Chaldæa a county in Asia: the Celtes in France call them Druids, Bards, and Semnothites: the Egyptians call them Priests; and the Cabalists call them Prophets. And so in divers countries Magick hath divers names. But we finde that the greatest part of those who were best seen into the nature of things, were excellent Magicians: as, amongst the Persians, *Zoroastres* the son of *Orimasius*, whom we spake of before; amongst the Romanes, *Numa Pompilius*; *Thespion*, amongst the Gymnosophists; *Zamolxis*, amongst the Thracians; *Abbaris*, amongst the Hyperboreans; *Hermes*, amongst the Ægyptians: and *Budda*, amongst the Babylonians. Beside these, *Apuleius* reckons up *Carinondas*, *Damigeron*, *Hismoses*, *Apollonius*, and *Dardanus*, who all followed *Zoroastres* and *Osthanes*.

Chap. II.

What is the Nature of Magick.

There are two sorts of Magick: the one is infamous, and unhappie, because it hath to do with foul spirits, and consists of Inchantments and wicked Curiosity; and this is called Sorcery; an art which all learned and good men detest; neither is it able to yeeld any truth of Reason or Nature, but stands meerly upon fancies and imaginations, such as vanish presently away, and leave nothing behinde them; as *Jamblichus* writes in his book concerning the mysteries of the Ægyptians. The other Magick

Magick is natural; which all excellent wise men do admit and embrace, and worship with great applause; neither is there any thing more highly esteemed, or better thought of, by men of learning. The most noble Philosophers that ever were, *Pythagoras*, *Empedocles*, *Democritus*, and *Plato*, forsook their own countries, and lived abroad as exiles and banished men, rather then as strangers; and all to search out and to attain this knowledge; and when they came home again, this was the Science which they professed, and this they esteemed a profound mysterie. They that have been most skilful in dark and hidden points of learning, do call this knowledge the very highest point, and the perfection of natural Sciences; insomuch that if they could find out or devise amongst all natural Sciences, any one thing more excellent or more wonderful then another, that they would still call by the name of Magick. Others have named it the practical part of natural Philosophy, which produceth her effects by the mutual and fit application of one natural thing unto another. The Platonicks, as *Plotinus* imitating *Mercurius*, writes in his book of Sacrifice and Magick, makes it to be a Science whereby inferiour things are made subject to superiours, earthly are subdued to heavenly; and by certain pretty allurements, it fetcheth forth the properties of the whole frame of the world. Hence the *Ægyptians* termed Nature her self a Magician, because she hath an alluring power to draw like things by their likes; and this power, say they, consists in love: and the things that were so drawn and brought together by the affinity of Nature, those (they said) were drawn by Magick. But I think that Magick is nothing else but the survey of the whole course of Nature. For, whilst we consider the Heavens, the Stars, the Elements, how they are moved, and how they are changed, by this means we find out the hidden secrecies of living creatures, of plants, of metals, and of their generation and corruption; so that this whole Science seems meerly to depend upon the view of Nature, as afterward we shall see more at large. This doth *Plato* seem to signifie in his *Alcibiades*, where he saith, *That the Magick of* Zoroastres, *was nothing else, in his opinion, but the knowledge and study of Divine things, wherewith the Kings Sons of* Persia, *amongst other princely qualities, were endued; that by the example of the Common-wealth of the whole world, they also might learn to govern their own Common-wealth.* And *Tully*, in his book of Divinations, saith, *That amongst the* Persians *no man might be a King, unless he had first learned the Art of Magick: for as Nature governs the world by the mutual agreement and disagreement of the creatures; after the same sort they also might learn to govern the Common-wealth committed unto them.* This Art, I say, is full of much vertue, of many secret mysteries; it openeth unto us the properties and qualities of hidden things, and the knowledge of the whole course of Nature; and it teacheth us by the agreement and the disagreement of things, either so to sunder them, or else to lay them so together by the mutual and fit applying of one thing to another, as thereby we do strange works, such as the vulgar sort call miracles, and such as men can neither well conceive, nor sufficiently admire. For this cause, Magick was wont to flourish in *Æthiopia* and *India*, where was great store of herbs and stones, and such other things as were fit for these purposes. Wherefore, as many of you as come to behold Magick, must be perswaded that the works of Magick are nothing else but the works of Nature, whose dutiful hand-maid Magick is. For if she find any want in the affinity of Nature, that it is not strong enough, she doth supply such defects at convenient seasons, by the help of vapours, and by observing due measures and proportions; as in Husbandry, it is Nature that brings forth corn and herbs, but it is Art that prepares and makes way for them. Hence was it that *Antipho* the Poet said, *That we overcome those things by Art, wherein Nature doth overcome us*; and *Plotinus* calls a Magician such a one as works by the help of Nature onely, and not by the help of Art. Superstitious, profane, and wicked men have nothing to do with this Science; her gate is shut against them: neither do we judge them worthy to be driven away from this profession onely, but even out of Cities, and out of the world, to be grievously punished, and utterly destroyed. But now, what is the duty, and what must be the learning of this professor, we purpose to shew in that which followeth.

CHAP.

CHAP. III.

The Instruction of a Magician, and what manner of man a Magician ought to be.

NOw it is meet to instruct a Magician, both what he must know, and what he must observe; that being sufficiently instructed every way, he may bring very strange and wonderful things to pass. Seeing Magick, as we shewed before, is a practical part of Natural Philosophy, therefore it behoveth a Magician, and one that aspires to the dignity of that profession, to be an exact and a very perfect Philosopher. For Philosophy teaches, what are the effects of fire, earth, air, and water, the principal matter of the heavens; and what is the cause of the flowing of the Sea, and of the divers-coloured Rain-bowe; and of the loud Thunder, and of Comets, and firy lights that appear by night, and of Earth-quakes; and what are the beginnings of Gold and of Iron; and what is the whole witty force of hidden Nature. Then also he must be a skilful Physician: for both these Sciences are very like and neer together; and Physick, by creeping in under colour of Magick, hath purchased favour amongst men. And surely it is a great help unto us in this kinde: for it teaches mixtures and temperatures, and so shews us how to compound and lay things together for such purposes. Moreover, it is required of him, that he be an Herbalist, not onely able to discern common Simples, but very skilful and sharp-sighted in the nature of all plants: for the uncertain names of plants, and their neer likeness of one to another, so that they can hardly be discerned, hath put us to much trouble in some of our works and experiments. And as there is no greater inconvenience to any Artificer, then not to know his tools that he must work with: so the knowledge of plants is so necessary to this profession, that indeed it is all in all. He must be as well seen also in the nature of Metals, Minerals Gems and Stones. Furthermore, what cunning he must have in the art of Distillation, which follows and resembles the showers and dew of heaven, as the daughter the mother; I think no man will doubt of it: for it yeelds daily very strange inventions, and most witty devices, and shews how to finde out many things profitable for the use of man: As for example, to draw out of things dewy vapours, unsavoury and gross sents or spirits, clots, and gummy or slimy humours; and that intimate essence which lurks in the inmost bowels of things, to fetch it forth, and sublimate it, that it may be of the greater strength. And this he must learn to do, not after a rude and homely manner, but with knowledge of the causes and reasons thereof. He must also know the Mathematical Sciences, and especially Astrologie; for that shews how the Stars are moved in the heavens, and what is the cause of the darkning of the Moon; and how the Sun, that golden planet, measures out the parts of the world, and governs it by twelve Signes: for by the sundry motions and aspects of the heavens, the celestial bodies are very beneficial to the earth; and from thence many things receive both active and passive powers, and their manifold properties: the difficulty of which point long troubled the Platonicks mindes, how these inferiour things should receive influence from heaven. Moreover, he must be skilful in the Opticks, that he may know how the sight may be deceived, and how the likeness of a vision that is seen in the water, may be seen hanging without in the air, by the help of certain Glasses of divers fashions; and how to make one see that plainly which is a great way off, and how to throw fire very far from us: upon which sleights, the greatest part of the secrecies of Magick doth depend. These are the Sciences which Magick takes to her self for servants and helpers; and he that knows not these, is unworthy to be named a Magician. He must be a skilful workman, both by natural gifts, and also by the practise of his own hands: for knowledge without practice and workmanship, and practice without knowledge, are nothing worth; these are so linked together, that the one without the other is but vain, and to no purpose. Some there are so apt for these enterprises, even by the gifts of Nature, that God may seem to have made them hereunto. Neither yet do I speak this, as if Art could not perfect any thing: for I know that good things may be made better, and there are means to remedy and help foward that which lacks per-

perfection. First, let a man consider and prepare things providently and skilfully, and then let him fall to work, and do nothing unadvisedly. This I thought good to speak of, that if at any time the ignorant be deceived herein, he may not lay the fault upon us, but upon his own unskilfulness: for this is the infirmity of the scholar, and not of the teacher: for if rude and ignorant men shall deal in these matters, this Science will be much discredited, and those strange effects will be accounted hap-hazard, which are most certain, and follow their necessary causes. If you would have your works appear more wonderful, you must not let the cause be known: for that is a wonder to us, which we see to be done, and yet know not the cause of it: for he that knows the causes of a thing done, doth not so admire the doing of it; and nothing is counted unusual and rare, but onely so far forth as the causes thereof are not known. *Aristotle* in his books of Handy-trades, saith, that master-builders frame and make their tools to work with; but the principles thereof, which move admiration, those they conceal. A certain man put out a candle; and putting it to a stone or a wall, lighted it again; and this seemed to be a great wonder: but when once they perceived that he touched it with brimstone, then, saith *Galen*, it ceased to seem a wonder. A miracle, saith *Ephesius*, is dissolved by that wherein it seemed to be a miracle. Lastly, the professor of this Science must also be rich: for if we lack money, we shall hardly work in these cases: for it is not Philosophy that can make us rich; we must first be rich, that we may play the Philosophers. He must spare for no charges, but be prodigal in seeking things out; and while he is busie and careful in seeking, he must be patient also, and think it not much to recal many things; neither must he spare for any pains: for the secrets of Nature are not revealed to lazie and idle persons. Wherefore *Epicharmus* said very well, that men purchase all things at Gods hands by the price of their labour. And if the effect of thy work be not answerable to my description, thou must know that thy self hast failed in some one point or another; for I have set down these things briefly, as being made for witty and skilful workmen, and not for rude and young beginners.

CHAP. IV.

The opinions of the antient Philosophers touching the causes of strange operations; and first, of the Elements.

THose effects of Nature which oft-times we behold, have so imployed the antient Philosophers minds in the searching forth of their causes, that they have taken great pains, and yet were much deceived therein; insomuch that divers of them have held divers opinions: which it shall not be amiss to relate, before we proceed any farther. The first sort held that all things proceed from the Elements, and that these are the first beginnings of things; the fire, according to *Hippasus Metapontinus*, and *Heraclides Ponticus*; the air, according to *Diogenes Apolloniates*, and *Anaximenes*; and the water, according to *Thales Milesius*. These therefore they held to be the very original and first seeds of Nature; even the Elements, simple and pure bodies (whereas the Elements that now are, be but counterfeits and bastards to them; for they are all changed, every one of them being more or less medled with one another) those, say they, are the material principles of a natural body, and they are moved and altered by continual succession of change; and they are so wrapt up together within the huge cope of heaven, that they fill up this whole space of the world which is situate beneath the Moon; for the fire being the lightest and purest Element, hath gotten up aloft, and chose it self the highest room, which they call the element of fire. The next Element to this is the Air, which is somwhat more weighty then the fire, and it is spread abroad in a large and huge compass; and passing through all places, doth make mens bodies framable to her temperature, and is gathered together sometimes thick into dark clouds, sometimes thinner into mists, and so is resolved. The next to these is the water; and then the last and lowest of all, which is scraped and compacted together out of the purer Elements, and

and is called the Earth; a thick and grosse substance, very solid, and by no means to be pierced through: so that there is no solid and firm body but hath earth in it, as also there is no vacant space but hath air in it. This Element of earth is situate in the middle and centre of all, and is round beset with all the rest; and this only stands still and unmoveable, whereas all the rest are carried with a circular motion round about it. But *Hippon* and *Critias* held that the vapours of the Elements were the first beginnings: *Parmenides* held that their qualities were the principles; for *all things* (saith he) *consist of cold and heat.* The Physitians hold that all things consist of four qualities, heat, cold, moisture, drouth, and of their predominancy when they meet together; for every Element doth embrace as it were with certain armes his neighbour-Element which is next situate to him; and yet they have also contrary and sundry qualities whereby they differ: for the wisdom of nature hath framed this workmanship of the world by due and set measure, and by a wonderful fitnesse and conveniency of one thing with another; for whereas every Element had two qualities, wherein it agreed with some, and disagreed with other Elements, nature hath bestowed such a double quality upon every one, as finds in other two her like, which she cleaves unto: as for example, the air and the fire; this is hot and dry, that is hot and moist: now dry and moist are contraries, and thereby fire and air disagree; but because either of them is hot, thereby they are reconciled. So the Earth is cold and dry, and the water cold and moist; so that they disagree, in that the one is moist, the other dry; but yet are reconciled, in as much as they are both cold; otherwise they could hardly agree. Thus the fire by little and little is changed into air, because either of them is hot; the air into the water, because either of them is moist; the water into the earth, because either of them is cold; and the earth into fire, because either of them is dry: and so they succeed each other after a most provident order. From thence also they are turned back again into themselves, the order being inverted, and so they are made mutually of one another: for the change is easie in those that agree in any one common quality; as fire and air be easily changed into each other, by reason of heat: but where either of the qualities are opposite in both, as in fire and water, there this change is not so easie. So then, heat, cold, moisture and drouth, are the first and principal qualities, in as much as they proceed immediately from the Elements, and produce certain secondary effects. Now two of them, namely heat and cold, are active qualities, fitter to be doing themselves, then to suffer of others: the other two, namely moisture and drouth, are passive; not because they are altogether idle, but because they follow and are preserved by the other. There are certain secondary qualities, which attend as it were upon the first; and these are said to work in a second sort; as to soften, to ripen, to resolve, to make lesse or thinner: as when heat works into any mixt body, it brings out that which is unpure, and so whilst it strives to make it fit for his purpose, that it may be more simple, the body becometh thereby smaller and thinner: so cold doth preserve, binde, and congeal; drouth doth thicken or harden, and makes uneven; for when there is great store of moisture in the utter parts, that which the drouth is not able to consume, it hardens, and so the utter parts become rugged; for that part where the moisture is gone, sinking down, and the other where it is hardened, rising up, there must needs be great roughnesse and ruggednesse: so moisture doth augment, corrupt, and for the most part works one thing by it self, and another by some accident; as by ripening, binding, expelling, and such like, it brings forth milk, urine, monethly flowers, and sweat; which the Physitians call the third qualities, that do so wait upon the second, as the second upon the first: and sometime they have their operations in some certain parts, as to strengthen the head, to succour the reins; and these, some call fourth qualities. So then, these are the foundations, as they call them, of all mixt bodies, and of all wonderful operations: and whatsoever experiments they proved, the causes hereof rested (as they supposed) and were to be found in the Elements and their qualities. But *Empedocles Agrigentinus* not thinking that the Elements were sufficient for this purpose, added unto them moreover concord and discord, as the causes of generation

tion and corruption: There be four principal seeds or beginnings of all things; *Jupiter*, that is to say, fire; *Pluto*, that is to say, earth; *Juno*, that is to say, air; and *Nestis*, that is to say, water: all these sometimes love and concord knits together in one, and sometimes discord doth sunder them and make them flie apart. This concord and discord, said he, are found in the Elements by reason of their sundry qualities wherein they agree and disagree: yea, even in heaven it self, as *Jupiter* and *Venus* love all Planets save *Mars* and *Saturn*, *Venus* agrees with *Mars*, whereas no Planet else agrees with him. There is also another disagreement amongst them, which ariseth from the oppositions and elevations of their houses: for even the twelve signs are both at concord and at discord among themselves, as *Manilius* the Poet hath shewed.

CHAP. V.

That divers operations of Nature proceed from the essential forms of things.

ALl the Peripateticks, and most of the latter Philosophers could not see how all operations should proceed from those causes which the Antients have set down; for they find that many things work quite contrary to their qualities, and therefore they have imagined that there is some other matter in it, and that it is the power and properties of essential formes. But now that all things may be made more plain, we must consider that it will be a great help unto us, for the making and finding out of strange things, to know what that is from whence the vertues of any thing do proceed: that so we may be able to discern and distinguish one thing from another, without confounding all order of truth. Whereas one and the same compound yeelds many effects of different kinds, as we shall find in the processe of this Book, yet every man confesseth that there is but one only original cause therein that produceth all these effects. And seeing we are about to open plainly this original cause, we must begin a little higher. Every natural substance (I mean a compound body) is composed of matter and form, as of her principles: neither yet do I exclude the principal qualities of the Elements from doing their part herein; for they also concur, and make up the number of three principles: for when the Elements meet together in the framing of any compound, the same compound retains certain excellent and chief qualities of theirs; whereof though all help together to bring forth any effects, yet the superiour and predominant qualities are held to do all, because they make the power of their inferiours to become theirs: for unlesse some were stronger then other, their vertues could not be perceived. Neither yet is the matter quite destitute of all force: I speak here, not of the first and simple matter, but of that which consists of the substances and properties of the Elements, especially the two passible elements, the Earth and the Water: and those which *Aristotle* calleth sometimes secondary qualities, sometimes bodily effects, we may term them the functions and powers of the matter; as thinnesse, thicknesse, roughnesse, smoothnesse, easinesse to be cleft, and such like, are altogether in the power of the matter, howbeit they proceed all from the Elements. Therefore to avoid confusion, it is better to hold that the effects of the qualities come of the temperature or mixture of the Elements, but the effects of the matter from the consistence or substances of them. But the Form hath such singular vertue, that whatsoever effects we see, all of them first proceed from thence; and it hath a divine beginning; and being the chiefest and most excellent part, absolute of her self, she useth the rest as her instruments, for the more speedy and convenient dispatch of her actions: and he which is not addicted nor accustomed to such contemplations, supposeth that the temperature and the matter works all things, whereas indeed they are but as it were instruments whereby the form worketh: for a workman that useth a graving Iron in the carving of an Image, doth not use it as though that could work, but for his own furtherance in the quicker and better performance thereof. Therefore whereas there are three efficient and working causes in every compound, we must not suppose

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any of them to be idle, but all at work, some more and some lesse; but above all other, the form is most active and busie, strengthening the rest; which surely would be to no purpose if the form should fail them, in as much as they are not capable of heavenly influences. And though the form of it self be not able to produce such effects, but the rest also must do their parts, yet are they neither confounded together, nor yet become divers things; but they are so knit among themselves, that one stands in need of anothers help. He that scans these things well by the search of reason, shall find no obscurity herein, nor confound the knowledge of the truth. Wherefore that force which is called the property of a thing, proceeds not from the temperature, but from the very form it self.

CHAP. VI.

Whence the Form cometh; and of the chain that Homer *faigned, and the rings that* Plato *mentioneth.*

SO then, the form, as it is the most excellent part, so it cometh from a most excellent place; even immediately from the highest heavens, they receiving it from the intelligences, and these from God himself: and the same original which the Form hath, consequently the properties also have. *Zeno Citticus* holds two beginnings, God and Matter; the one of them active or efficient, the other the passive principle. For God, as *Plato* thinks, when by the Almighty power of his Deity he had framed in due measure and order the heavens, the stars, and the very first principles of things the Elements, which wast away by reason of so many generations and corruptions, did afterwards by the power of the Heavens and Elements, ordain the kinds of living creatures, plants, and things without life, every one in their degree, that they might not be of the same estate and condition as the heavens are; and he enjoyned inferiour things to be ruled of their superiours, by a set Law, and poured down by heavenly influence upon every thing his own proper Form, ful of much strength and activity: and that there might be a continual encrease amongst them, he commanded all things to bring forth seed, and to propagate and derive their Form wheresoever should be fit matter to receive it. So then, seeing that formes come from heaven, they must needs be counted Divine and heavenly things: for such is the pattern and the most excellent cause of them, which *Plato*, that chief Philosopher, calls the soul of the World, and *Aristotle* universal Nature, and *Avicenna* calls it the Form-giver. This Form-giver doth not make it of any thing, as though it were but some frail and transitory substance, but fetcheth it meerly out of himself, and bestows it first upon intelligences and stars, and then by certain aspects informeth the Elements, as being fit instruments to dispose the matter. Seeing therefore this Form cometh from the Elements, from heaven, from the intelligences, yea from God himself; who is so foolish and untoward, as to say that it doth not savour of that heavenly nature, and in some sort of the Majesty of God himself? and that it doth not produce such effects, as nothing can be found more wonderfull, seeing it hath such affinity with God? Thus hath the providence of God linked things together in their rankes and order, that all inferiour things might by their due courses be derived originally from God himself, and from him receive their Operations. For God the first cause and beginner of things, as *Macrobius* saith, of his own fruitfulnesse hath created and brought forth a Spirit, the Spirit brought forth a Soul, (but the truth of Christianity saith otherwise) the Soul is furnished partly with reason, which it bestows up Divine things, as heaven and the stars (for therefore are they said to have Divine Spirits) and partly with sensitive and vegetative powers, which it bestows upon frail and transitory things. Thus much *Virgil* well perceiving, calleth this Spirit, The soul of the World; The Spirit, saith he, cherisheth it within, and conveying it self through the inmost parts, quickens and moves the whole lump, and closeth with this huge body. Wherefore seeing Man stands as it were in the middle, betwixt eternal and those transitory things, and is not

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altogether so excellent as heaven, and yet, because of his reason, more excellent then other living creatures; and he hath also the sensitive power: therefore the other living creatures, as it were degenerating from man, are indued onely with the two powers that remain, the sensitive and vegetative powers. But the Trees or Plants, because they have neither sense nor reason, but do onely grow are said to live only in this respect, that they have this vegetative soul. This the same Poet doth expresse a little after. Seeing then the Spirit cometh from God, and from the Spirit cometh the soul, and the soul doth animate and quicken all other things in their order, that Plants and bruit beasts do agree in vegetation or growing, bruit beasts with Man in sense, and Man with the Divine creatures in understanding, so that the superior power cometh down even from the very first cause to these inferiours, deriving her force into them, like as it were a cord platted together, and stretched along from heaven to earth, in such sort as if either end of this cord be touched, it will wag the whole; therefore we may rightly call this knitting together of things, a chain, or link and rings, for it agrees fitly with the rings of *Plato*, and with *Homers* golden chain, which he being the first author of all divine inventions, hath signified to the wise under the shadow of a fable, wherein he feigneth, that all the gods and goddesses have made a golden chain, which they hanged above in heaven, and it reacheth down to the very earth. But the truth of Christianity holdeth that the Souls do not proceed from the Spirit, but even immediately from God himself. These things a Magician being well acquainted withal, doth match heaven and earth together, as the Husband-man plants Elmes by his Vines; or to speak more plainly, he marries and couples together these inferiour things by their wonderful gifts and powers, which they have received from their superiours; and by this means he, being as it were the servant of Nature, doth bewray her hidden secrets, and bring them to light, so far as he hath found them true by his own daily experience, that so all men may love, and praise, and honour the Almighty power of God, who hath thus wonderfully framed and disposed all things.

CHAP. VII.

Of Sympathy and Antipathy; and that by them we may know and find out the vertues of things.

BY reason of the hidden and secret properties of things, there is in all kinds of creatures a certain compassion, as I may call it, which the Greeks call Sympathy and Antipathy; but we term it more familiarly, their consent, and their disagreement. For some things are joyned together as it were in a mutual league, and some other things are at variance and discord among themselves; or they have something in them which is a terror and destruction to each other, whereof there can be rendred no probable reason: neither will any wise man seek after any other cause hereof but only this, That it is the pleasure of Nature to see it should be so, that she would have nothing to be without his like, and that amongst all the secrets of Nature, there is nothing but hath some hidden and special property; and moreover, that by this their Consent and Disagreement, we might gather many helps for the uses and necessities of men; for when once we find one thing at variance with another, presently we may conjecture, and in trial so it will prove, that one of them may be used as a fit remedy against the harms of the other: and surely many things which former ages have by this means found out, they have commended to their posterity, as by their writings may appear. There is deadly hatred, and open enmity betwixt Coleworts and the Vine; for whereas the Vine windes it self with her tendrels about every thing else, she shuns Coleworts only: if once she come neer them, she turns her self another way, as if she were told that her enemy were at hand: and when Coleworts is seething, if you put never so little wine unto it, it will neither boil nor keep the colour. By the example of which experiment, *Androcides* found out a remedy against wine, namely, that Coleworts are good against drunken-

drunkennesse, as *Theophrastus* saith, in as much as the Vine cannot away with the savour of Coleworts. And this herbe is at enmity with Cyclamine or Sow-bread; for when they are put together, if either of them be green, it will dry up the other: now this Sow-bread being put into wine, doth encrease drunkennesse, whereas Coleworts is a remedy against drunkennesse, as we said before. Ivy, as it is the bane of all Trees, so it is most hurtful, and the greatest enemy to the Vine; and therefore Ivy also is good against drunkennesse. There is likewise a wonderful enmity betwixt Cane and Fern, so that one of them destroyes the other. Hence it is that a Fern root powned, doth loose and shake out the darts from a wounded body, that were shot or cast out of Canes: and if you would not have Cane grow in a place, do but plow up the ground with a little Fern upon the Plough-shear, and Cane will never grow there. Strangle-tare or Choke-weed desires to grow amongst Pulse, and especially among Beans and Fetches, but it choaks them all: and thence *Dioscorides* gathers, That if it be put amongst Pulse, set to seethe, it will make them seethe quickly. Hemlock and Rue are at enmity; they strive each against other: Rue must not be handled or gathered with a bare hand, for then it will cause Ulcers to arise; but if you do chance to touch it with your bare hand, and so cause it to swell or itch, anoint it with the juice of Hemlock. Much Rue being eaten, becometh poison; but the juice of Hemlock expels it; so that one poison poisoneth another: and likewise Rue is good against Hemlock being drunken, as *Dioscorides* saith. A wilde Bull being tyed to a Fig-tree, waxeth tame and gentle, as *Zoroaster* saith, who compiled a book called *Geoponica*, out of the choice writings of the Antients. Hence it was found out, that the stalks of a wilde Fig-tree, if they be put to Beef as it is boiling, make it boil very quickly, as *Pliny* writeth; and *Dioscorides* ministreth young figs that are full of milky juice, together with a portion of water and vinegar, as a remedy against a draught of Bulls blood. The Elephant is afraid of a Ram, or an engine of war so called: for as soon as ever he seeth it, he waxeth meek, and his fury ceaseth: hence the Romans by these engines put to flight the Elephants of *Pyrrhus* King of the Epyrotes, and so got a great victory. Such a contrariety is there betwixt the Elephants members, and that kind of Lepry which makes the skin of a man like the skin of an Elephant; and they are a present remedy against that disease. The Ape of all other things cannot abide a Snail: now the Ape is a drunken beast, for they are wont to take an Ape by making him drunk; and a Snail well washed is a remedy against drunkennesse. A man is at deadly hatred with a Serpent: for if he do but see a Serpent, presently he is sore dismaid; and if a woman with child meet a Serpent, her fruit becometh abortive: hence it is, that when a woman is in very sore travel, if she do but smell the fume of an Adders hackle, it will presently either drive out, or destroy her child: but it is better to anoint the mouth of the womb in such a case, with the fat of an Adder. The sight of a Wolfe is so hurtful to a man, that if he spie a man first, he takes his voice from him; and though he would fain cry out, yet he cannot speak: but if he perceive that the man hath first espied him, he makes no ado, but his savage fury ceaseth, and his strength failes him. Hence came that proverb, *Lupus in fabula*, the Wolf cometh in the nick; which *Plato* speaks of in his Politicks. The Wolf is afraid of the Urchin; thence, if we wash our mouth and throats with Urchines blood, it will make our voice shrill, though before it were hoarse and dull like a Wolves voice. A Dog and a Wolfe are at great enmity; and therefore a Wolves skin put upon any one that is bitten of a mad Dog, asswageth the swelling of the humour. An Hawk is a deadly enemy to Pigeons, but they are defended by the Kastrel, which the Hawk cannot abide either to hear or see: and this the Pigeons know well enough; for wheresoever the Kastrel remains, there also will the Pigeons remain, thinking themselves safe because of their protector. Hence *Columella* saith, That there is a kind of Hawks which the common-people call a Kastrel, that builds her nest about houses, that is very good to keep away hawks from a Pigeon-house: If you take the Kastrels young ones and put them in divers earthen pots, and cover the pots close, & plaister them round about, and hang them up in sundry corners of a Pigeon-house, the Pigeons will be so far

in love with the place, that they will never forsake it. Hither belongeth that notable Disagreement that is betwixt Garlick and the Load-stone: for being smeared about with Garlike, it will not draw iron to it; as *Plutark* hath noted, and after him *Ptolomaus*: the Load-stone hath in it a poisonous vertue, and Garlick is good against poison: but if no man had written of the power of Garlick against the Load-stone, yet we might conjecture it to be so, because it is good against vipers, and mad dogs, and poisonous waters. So likewise those living creatures that are enemies to poisonous things, and swallow them up without danger, may shew us that such poisons will cure the bitings and blows of those creatures. The Hart and the Serpent are at continual enmity: the Serpent as soon as he seeth the Hart, gets him into his hole, but the Hart draws him out again with the breath of his nostrils, and devours him: hence it is that the fat and the blood of Harts, and the stones that grow in their eyes, are ministred as fit remedies against the stinging and biting of serpents. Likewise the breath of Elephants draws Serpents out of their dens, and they fight with Dragons; and therefore the members of Elephants burned, drives away Serpents. The Storks drive out of the Countreyes where they are, Lyzards, and sundry kinds of Serpents, and other noisome things in the fields: and the intrails of them all are good against the Storks. The same is done also in Egypt by the bird Ibis. That Indian Rat, called *Ichneumon*, doth harnesse himself with some of the Lote-tree, and so fights against the Asp. The Lamprey fights with Serpents, and with her biting, kills the Basilisk, which is the most poisonous serpent that is. So also the crowing of a Cock affrights the Basilisk, and he fights with Serpents to defend his hens; and the broth of a Cock is a good remedy against the poison of serpents. So the Snail and the Eagle. The Stellion, which is a beast like a Lyzard, is an enemy to the Scorpions; and therefore the oyle of him being putrified is good to anoint the place which is stricken by the Scorpion. The Barbel eats up the Sea-hare, and is good against the poison thereof. A Swine eats up a Salamander, without danger, and is good against the poison thereof. The Hawk is an enemy to the Chamæleon, and his dung drunken in wine, is good against the poison of the Chamæleon. Likewise out of the Sympathies of plants, we may gather some secret, which is helpful against some kind of hurt. The herb Corruda, whereof Sperage comes, is most fitly planted where Reed grows, because they are of much likenesse and neernesse; and both of them are inciters to lust. The Vine and the Olive-tree do joy in each others company, as *Africanus* writes: both of them are very commodious for mens uses. In like manner the Morehenne loves the Hart, which is given to lust; both of their members are inciters to venery. The Goat and the Partridge love each other; and both these are good for one and the same remedy. So the fish Sargus and the Goat. A Dog is most friendly to a man; and if you lay him to any diseased part of your body, he takes away the disease to himself; as *Pliny* reporteth.

CHAP. VIII.

That things receive their force and power from Heaven, and from the Stars; and that thereby many things are wrought.

I Suppose that no man doubts but that these inferiour things serve their superiours, and that the generation and corruption of mutable things, every one in his due course and order, is over-ruled by the power of those heavenly Natures. The Ægyptians, who first proved and found out the effects of the heavens, because they dwelt in the open Champion-fields, where they had continually fair weather, and there were no vapours sent up from the earth which might hinder their contemplation of heaven, so that they might continually behold the Stars in their brightnesse, did therefore wholly bestow themselves in the knowledge of heavenly influences: and whereas others that were not so diligent as they, stood amazed at the causes of things, these men referred all to the heavens, and the Stars, that all things took their destiny from them, and that the influence of heaven bare great sway in all generations and corruptions; and thus observing the motions of the stars to and fro, they wrought many wonderful things;

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for this was their resolution, that to certain hours and set times, there were answerable certain aspects of superiour powers, whereby all things were effected. *Ptolomy* was of the same minde, who reduced the heavenly influences to a certain order, and thereby did prognosticate many things: and he thought the matter so clear, that it need not much proof: and moreover, that the increase and decrease of all plants, and all living creatures, more or lesse, did proceed from the power and stroke of the stars. *Aristotle*, finding that the highest motion was the cause and beginning of all things, (for if that should cease, these must needs presently decay) saith, that it was necessary for this world to be placed very neer and close to the superiour motions, that all power might be thence derived; and he saw that all this force of inferiour things was caused from the Sun, as he himself fitly shews: The winding course of the Sun, saith he, in the oblique circle of the Zodiak, causeth the generation and corruption of all transitory things; and by his going to and fro, distinguisheth times and seasons. *Plato* saith, that the circular motions of the heavens are the causes of fruitfulnesse and barrennesse. The Sun is the Governour of time, and the rule of life. Hence *Jamblichus* following the doctrine of the *Ægyptians*, saith, that every good thing cometh certainly from the power of the Sun; and if we receive any good from any thing else, yet the Sun must perfect and finish it. *Heraclitus* calls the Sun, the Fountain of heavenly light; *Orpheus* calls it the light of life; *Plato* calls it a heavenly Fire, an everliving Creature, a star that hath a Soul, the greatest and the daily star: and the natural Philosophers call it the very heart of heaven. And *Plotinus* shews, that in antient times the Sun was honoured in stead of God. Neither yet is the Moon lesse powerful, but what with her own force, and what with the force of the Sun which she borrows, she works much, by reason of her neernesse to these inferiours. *Albumasar* said, That all things had their vertue from the Sun and the Moon: and *Hermes* the learned said, that the Sun and the Moon are the life of all things living. The Moon is nighest to the Earth of all Planets; she rules moist bodies, and she hath such affinity with these inferiours, that as well things that have souls, as they that have none, do feel in themselves her waxing, and her waining. The Seas and Flouds, Rivers and Springs, do rise and fall, do run sometimes swifter, sometimes slower, as she rules them. The surges of the Sea are tost to and fro, by continual succession; no other cause whereof the Antients could find but the Moon only: neither is there any other apparent reason of the ebbing and flowing thereof. Living creatures are much at her beck, and receive from her great encrease: for when she is at the full, as *Lucilius* saith, she feeds Oysters, Crabs, Shelfish, and such like, which her warm light doth temper kindly in the night season; but when she is but the half or the quarter light, then she withdraws her nourishment, and they waste. In like manner, Cucumbers, Gourds, Pompons, and such like, as have store of waterish juice, feel the state of the Moon: for they wax as she doth; and when she waineth, they waste, as *Athenæus* writes. Likewise the very stems of plants do follow the state of the heavens; witnesse the Husband-man, who finds it by experience in his graffing: and skilful Husbandmen have found the course and season of the year, and the monethly race of the Moon so necessary for plants, that they have supposed this knowledge to be one chief part of Husbandry. So also, when the Moon passeth through those signs of the Zodiak which are most peculiar to the earth, if you then plant trees, they will be strongly rooted in the earth: if you plant them when she passeth through the signs of the Air, then the tree so planted, will be plentiful in branches and leaves, and encreaseth more upward then downward. But of all other, the most pregnant sign hereof is found in the Pome-granate; which will bring forth fruit just so many years, as many daies as the Moon is old when you plant it. And it is a report also, that Garlick, if it be set when the Moon is beneath the earth, and be also plucked up at such a time, it will lose its strong savour. All cut and lopped Woods, as Timber and Fewel, are full of much moisture at the new of the Moon; and by reason of that moisture, they wax soft, and so the worm eats them, and they wither away. And therefore *Democritus* counselleth, and *Vitruvius* is also of the same minde, to cut or lop trees in the

the waining of the Moon, that being cut in season, they may last long without rottennesse. And that which is more, as her age varies, so her effects vary according to her age; for in her first quarter, she maketh hot and moist, but especially moist; from thence all moist things grow and receive their humidity in that time: from that time to the full of the Moon, she gives heat and moisture equally, as may be seen in Trees and Minerals: from that time to the half Moon decaying, she is hot and moist, but especially hot, because she is fuller of light; thence the fishes at that time commonly are wont to swim in the top of the water; and that the Moon is in this age warm, appears by this, that it doth extend and enlarge moist bodies; and thereby the moisture encreasing, it causeth rottennesse, and maketh them wither and waste away. But in her last quarter, when she loseth all her light, then she is meerly hot; and the wises of *Chaldea* hold that this state of heaven is best of all other. So they report that there is a Moon-herb, having round twirled leaves of a blewish colour, which is well acquainted with the age of the Moon; for when the Moon waxeth, this herb every day of her age brings forth a leaf; and when she waineth, the same herb loseth for every day a leaf. These variable effects of the Moon, we may see more at large, and more usually in tame creatures and in plants, where we have daily sight and experience thereof. The Pismire, that little creature, hath a sense of the change of the Planets: for she worketh by night about the full of the Moon, but she resteth all the space betwixt the old and the new Moon. The inwards of mice answer the Moons proportion; for they encrease with her, and with her they also shrink away. If we cut our hair, or pair our nailes before the new Moon, they will grow again but slowly; if at or about the new Moon, they will grow again quickly. The eyes of Cats are also acquainted with the alterations of the Moon, so that they are sometimes broader as the light is lesse, and narrower when the light of the Moon is greater. The Beetle marketh the ages and seasons of the Planets: for he gathering dung out of the mixen, rounds it up together, and covereth it with earth for eight and twenty daies, hiding it so long as the Moon goeth about the Zodiak; and when the new Moon cometh, he openeth that round Ball of dirt, and thence yields a young Beetle. Onions alone, of all other herbs, (which is most wonderful) feels the changeable state of the Planets, but quite contrary to their change frameth it self; for when the Moon waineth, the Onions encrease; and when she waxeth, they decay: for which cause the Priests of *Egypt* would not eat Onions, as *Plutark* writes in his fourth Commentary upon *Hesiode*. That kinde of spurge which is called *Helioscopium*, because it follows the Sun, disposeth of her leaves as the Sun rules them; for when the Sun riseth, she openeth them, as being desirous that the morning should see them rise; and shutteth them when the Sun setteth, as desiring to have her flower covered and concealed from the night. So many other herbs follow the Sun, as the herb Turn-sole: for when the Sun riseth, she holds down her head all day long, that the Sun may never so much as writhe any of her (there is such love as it were betwixt them) and she stoops still the same way which the Sun goeth: so do the flowers of Succory and of Mallows. Likewise the pulse called Lupines, still looks after the Sun, that it may not writhe his stalk; and this watcheth the Suns motion so duly, that like a Dial it shews the Husband-man the time of the day, though it be never so cloudy; and they know thereby the just time when the Sun setteth: and *Theophrastus* saith, that the flower of the herb Lotum, is not onely open and shut, but also sometimes hides, and sometimes shews her stalk from Sun-set to midnight; and this, saith he, is done about the River *Euphrates*. So the Olive-tree, the Sallow, the Linden-tree, the Elm, the white Pople-tree, they declare the times of the Suns standing, when it turns back again from the Poles; for then they hide their leaves, and shew only their hoar-white backs. In like manner winter-Cresses or Irium, and Penyrial, though they begin to wither being gathered, yet if you hang them upon a stick about the time of the Solstice, they will for that time flourish. The stone Selenites, (as much as to say, the Moon-beam) called by others Aphroselinon, contains in it the Image of the Moon, and shews the waxing and waining of it every day in the same Image. Another stone there

there is, that hath in it a little cloud that turns about like the Sun, sometimes hiding, & sometimes shewing it self. The Beast Cynocephalus rejoiceth at the rising of the Moon, for then he stands up, lifting his fore-feet toward heaven, and wears a Royal Ensign upon his head: and he hath such a Sympathy with the Moon, that when she meets with the Sun (as betwixt the old and new Moon) so that she gives no light, the male, or He-Cynocephalus, never looks up, nor eats any thing, as bewailing the losse of the Moon; and the female, as male-content as He, all that while pisseth blood: for which causes, these beasts are nourished and kept in hallowed places, that by them the time of the Moones meeting with the Sun may be certainly known, as *Orus* writes in his Hieroglyphicks. The star Arcturus, at his rising causeth rain. Dogs are well acquainted with the rising of the Canicular star; for at that time they are commonly mad; and so are vipers and serpents; nay, then the very standing pools are moved, and wines work as they lye in the Cellar, and other great and strange effects are wrought upon earth: when this star riseth, Basil-gentle waxeth whiterish, and Coriander waxeth dry, as *Theophrastus* writeth. The rising of this star was wont to be diligently observed every year; for thereby they would prognosticate, whether the year following would be wholesome or contagious, as *Heraclides Ponticus* saith: for if it did rise dark and gloomy, it was a sign that the Air would be thick and foggy, which would cause a pestilence: but if it were clear and lightsome, it was a sign that the Air would be thin and well purged, and consequently healthful. In ancient times they much feared this Star, so that they ordained a dog to be offered in sacrifice to it, as *Columella* saith, that this star is pacified with the blood and entrails of a sucking whelp; and *Ovid* likewise saith, that a dog bred on the earth, is sacrificed to the Dog-star in Heaven. The Beast or wilde Goat, which in *Egypt* is called *Oryx*, hath a sense or feeling of this Star before it riseth; for then he looks upon the Sun-beams, and in them doth honour the Canicular star. *Hippocrates* saith, it is not good either to purge or let blood, before or after this star riseth; and *Galen* shews that many very necessary operations of this Star must be observed in Critical dayes, and likewise in sowing and planting. Moreover, the greater stars and constellations must be known, and at what time they go out of the signs, whereby are caused many waterish and fiery impressions in the Air. And whosoever is rightly seen in all these things, he will ascribe all these inferiours to the stars as their causes; whereas if a man be ignorant hereof, he loseth the greatest part of the knowledge of secret operations and works of nature. But of this argument, we have spoken in our writings of the knowledge of Plants.

Chap. IX.

How to attract and draw forth the vertues of superiour Bodies.

We have shewed before, the operations of celestial bodies into these inferiours, as also the Antipathy and Sympathy of things: now will we shew, by the affinity of Nature, whereby all things are linked together as it were in one common bond, how to draw forth and to fetch out the vertues and forces of superior bodies. The Platonicks termed Magick to be the attraction or fetching out of one thing from another, by a certain affinity of Nature. For the parts of this huge world, like the limbs and members of one living creature, do all depend upon one Author, and are knit together by the bond of one Nature: therefore as in us, the brain, the lights, the heart, the liver, and other parts of us do receive and draw mutual benefit from each other, so that when one part suffers, the rest also suffer with it; even so the parts and members of this huge creature the World, I mean all the bodies that are in it, do in good neighbour-hood as it were, lend and borrow each others Nature; for by reason that they are linked in one common bond, therefore they have love in common; and by force of this common love, there is amongst them a common attraction, or tilling of one of them to the other. And this indeed is Magick. The concavity or hollownesse of the Sphere of the Moon, draws up fire to it, because of the affinity of their Natures; and the Sphere of the fire

likewise

likewise draws up Air; and the centre of the world draws the earth downward, and the natural place of the waters draws the waters to it. Hence it is that the Load-stone draws iron to it, Amber draws chaff or light straws, Brimstone draws fire, the Sun draws after it many flowers and leaves, and the Moon draws after it the waters. *Plotinus* and *Synesius* say, Great is nature everywhere; she layeth certain baits whereby to catch certain things in all places: as she draws down heavy things by the centre of the earth, as by a bait; so she draws light things upward by the concavity of the Moon; by heat, leaves; by moisture, roots; by one bait or another, all things. By which kind of attraction, the Indian Wisards hold that the whole world is knit and bound within it self: for (say they) the World is a living creature, everywhere both male and female, and the parts of it do couple together, within and between themselves, by reason of their mutual love; and so they hold and stand together, every member of it being linked to each other by a common bond; which the Spirit of the World, whereof we spake before, hath inclined them unto. For this cause *Orpheus* calleth *Jupiter*, and the Nature of the World, man and wife; because the World is so desirous to marry and couple her parts together. The very order of the Signs declareth, that the World is everywhere male and female; for the former is the male, the latter is the female: so also Trees and Herbs have both sexes, as well as living creatures: so the fire is to the Air, and the water to the Earth, as a male to the female: so that it is no marvel, that the parts of the World desire so much to be matcht together. The Planets are partly male, and partly female; and *Mercury* is of both sexes it self. These things the Husband-man perceiving, prepares his field and his seed, for heavenly influences to work upon; the Physitian likewise observes the same, and works accordingly, for the preservation both of our bodies, and of universal Nature. So the Philosopher who is skilful in the Stars (for such is properly a Magician) works by certain baits, as it were, fitly matching earthly and heavenly things together, and platting them as skilfully one within another, as a cunning Husband-man planteth an old graffe into a young stock: nay, he layeth earthly things under heavenly things, and inferiours so fitly for their superiours everywhere to work upon, as if a man should lay iron before the Load-stone to be drawn to it, or Christal before the Sun to be enlightened by it, or an Egge under a Hen to hatch it. Furthermore, as some can so cherish egges, that even without the help of living creatures, they will make them live; yea and oftentimes they will prepare such matter, so cunningly, that even without egges, or any apparent seeds, they will bring forth living creatures, (as they will bring forth Bees, of an Ox; and a Scorpion, of Basil;) working together by the help of universal Nature upon the vantage of fit matter, and a seasonable or convenient time: even so the Magician, when once he knows which and what kinds of matters Nature hath partly framed, and partly Art hath perfected, and gathered together, such as are fit to receive influence from above; these matters especially doth he prepare and compound together, at such a time as such an influence raigneth; and by this means doth gain to himself the vertues and forces of heavenly bodies: for wheresoever there is any matter so directly laid before superiour bodies, as a looking-glasse before ones face, or as a wall right before ones voice; so doth it presently suffer the work of the Superiours, the most mighty Agent, and the admirable life and power of all things shewing it self therein. *Plotinus* in his Book of Sacrifice and Magick, saith, That the Philosophers considering this affinity and bond of Nature, wherewith all natural things are linked each to other, did thence frame the Art of Magick, and acknowledged both that the superiours might be seen in these inferiours, and these inferiours in their superiours; earthly things in heavenly, though not properly, but in their causes, and after a heavenly sort; likewise heavenly things in earthly, but yet after an earthly sort. For whence should we suppose it to be, that the plants called Sun-followers, should still follow the Suns motion? and likewise the Moon-followers, the Moons motion? Wherefore surely even in earth we may behold both the Sun and the Moon; but yet by reason of their quality upon earth; and so in heaven we may behold all plants, and stones, and living creatures, but yet as following the heavenly natures: which things the Antients perceiving, did

did apply and lay some earthly things to some heavenly, and thence brought down the celestial forces into these inferiours, by reason of their likeness one with the other; for the very likenesse of one thing to another, is a sufficient bond to link them together. If a man do heat a piece of paper, and then lay it a little under the flame of a candle, though they do not touch each other, yet he shall see the paper presently burn, and the flame will still descend till it have burned all the paper. Let us now suppose the paper thus heated, to be that affinity which is betwixt superiours and inferious; and suppose we also, that this laying of the paper to the candle, to be the fit applying of things together, both for matter, and time, and place: let us suppose yet farther, the flame taking hold of the paper, to be the operation of some heavenly body into a capable matter; and last of all, we may suppose the burning of the paper, to be the altering of that matter into the nature of the celestial body that works upon it, and so purifies it, that in the end it flieth upward like burning flax, by reason of some heavenly seeds and sparks which it hath within it self.

Chap. X.

How the knowledge of secrecies dependeth upon the survey and viewing of the whole World.

WE are perswaded that the knowledge of secret things depends upon the contemplation and view of the face of the whole world, namely, of the motion, state and fashion thereof, as also of the springing up, the growing and the decaying of things: for a diligent searcher of Natures workes, as he seeth how Nature doth generate and corrupt all things, so doth he also learn to do. Likewise he learns of living creatures; which though they have no understanding, yet their senses are far quicker then ours; and by their actions they teach us Physick, Husbandry, the art of Building, the disposing of Houshold affairs, and almost all Arts and Sciences: the like may be observed in Metals, Gems, and Stones. The beasts that have no reason, do by their nature strangely shun the eyes of witches, and hurtful things: the Doves, for a preservative against inchantments, first gather some little Bay-tree boughs, and then lay them upon their nests, to preserve their young; so do the Kites use white brambles, the Turtles sword-grasse, the Crows Withy, the Lapwings Venus-hair, the Ravens Ivy, the Herns Carrot, the Partridges Reed-leaves, the Black-birds Myrtle, the Larkes grasse, the Swans Park-leaves, the Eagle useth Maiden-hair, or the stone Ætites for the same purpose. In like mannner they have shewed us preservatives against poysons: the Elephant having by chance eaten a Chamæleon, against the poyson thereof, eats of the wilde Olive; whence *Solinus* observes, That the same is a good remedy for men also in the same case. The Panthers, having swallowed up the poisonous herb Aconitum, wherewith the Hunters besmear pieces of flesh so to destroy them, against the poyson thereof seek out mans dung. The Tortoise, having eaten a serpent, dispels the poyson by eating the herb Origan. When Bears have tasted the fruit of the Mandrakes, they eat Pismires against the poyson thereof. There is a kind of Spider which destroyeth the Harts, except presently they eat wilde Ivy; and whensoever they light upon any poysonous food, they cure themselves with the Artichoke; and against Serpents they prepare and arm themselves with wilde Parsneps; so do the Ring-doves, Choughs, and Black-birds use Bay-leaves. The little worm Cimex is good against the biting of Aspes; as *Pliny* shews by Hens, who, if they eat that worm, are all day after, free from the hurt of Aspes. Goats care not for Basil-gentle, because it brings a Lethargy, as *Chrysippus* writes. The same Beasts have also shewed us what herbs are good to cure wounds. When the Harts are wounded by the Cretians, they seek out the herb Dittany, and presently the darts fall out of their bodies. And so do the Goats. The Elephant being wounded, seeks out the juice of Aloes, and thereby is cured. The same Beasts have also found out purgations for themselves, and thereby taught us the same. An Asse eats the herb Asplenum to purge his melancholy; of

whom

whom the Physitians have learned to Minister the same herb for the same purpose. The Hinde purges her self with large Cummin, before she bringeth forth, that her birth may come the more easily from her. *Aristotle* saith, That Boars feed upon the herb Aram, or Wake-robin, to keep them soluble Pigeons and Cocks feed upon Pellitory, for the sharpening of their stomack. Dogs eat grasse to purge all their noisome humours, which otherwise would make them mad. Of all these, men have learned to use such Medicines against the like diseases. A Lion being sick of a quartane Ague, eats and devours Apes, and so is healed: hence we know that Apes blood is good against an Ague. The griping of the belly and guts, is healed by looking upon Geese and Ducks, and *Vegetius* writes; and *Columella* saith, that if a Duck do but look upon a sick horse, she heals him: and *Pliny* saith, that if you lay a Duck to the griping of ones belly, she takes away the disease, and dies of it her self; and *Marcellus* writes, That it is good for one that is so troubled, to eat the flesh of a Duck. Goats and Does are never purblind, because they eat certain herbs. Hawks, as soon as they feel their sight dim, they eat Sow-thistle. Elephants, against the diseases of their eyes, drink milk. Serpents have caused Fennel to be very famous; for as soon as they taste of it, they become young again, and with the juice thereof repair their sight; whence it is observed, that the same is good to repair a mans sight that is dim. Hares feed upon herbs that have juice like milk, and therfore in their bellies they have a cream; whence Shepherds have learned to make cream of many such herbs pressed together. Partridges eat leeks, to make their voices clear, as *Aristotle* writes; and according to their example, *Nero*, to keep his voice clear, eat nothing but oyle of leeks, certain dayes in every moneth. These Beasts have likewise found out many instruments in Physick. The Goats, when their eyes are blood-shotten, let out the blood; the She-goat by the point of a bull-rush, the He-goat by the pricking of a thorn, which lets out the evil humour, and yet never hurts the eye, but restores him his perfect sight: hence, men learned by such means to cure the eyes. The Ægyptians say, they never learned of men to minister clysters, but of the bird Ibis, which useth it to her self for the loosnesse of her body. And of the same bird also they learned their diet, to eat largely at the waxing, and sparingly at the waining of the Moon. Bears eyes are oft-times dimmed; and for that cause they desire hony-combs above all things, that the Bees stinging their mouths, may thereby draw forth, together with the blood, that dull and grosse humour: whence Physitians learned to use letting blood, to cure the dimnesse of the eyes. The Gullie-gut, when he is full of meat, he pitcheth himself betwixt two trees, so to force out excrements.

CHAP. XI.

That the likeness of things sheweth their secret vertues.

WHo so looks into the writings of the Ancients, namely, *Hermes, Orpheus, Zoroastres, Harpocration*, and other such like skilful men as have invented and registred the secrecies of this Art, shall find that they gathered all from that likenesse of seeds, fruits, flowers, leaves and roots, as also of the stars, metals, gems, and stones; that likenesse, I say, which these things have to the diseases and parts of a mans body, as also of other living creatures: and out of those Writers, afterward *Hippocrates*, *Dioscorides*, *Pliny*, and the rest, culled out as many such secrecies as they found to be true, and recorded them in their own books; except some certain things, which they thought were no secries, but either of folloy or of envy, accounted them to be ordinary and plain matters. I will relate two or three examples of those former secrecies. *Theophrastus* speaking of those herbs that resemble the Scorpion and the Polypus, saith, That some herbs have a peculiar kind of form, as the root of the herb Scorpius, called by some Walwort, and the root of Polypody: for that it is like a Scropion, and is good against the sting of him; and this is rough, and full of hollow partitions like the Polypus, and is of force to kill him. And in another place he saith, That many things are written of the force of plants, not without just cause;

as

as for example, to make fruitful and barren; both which, the herb Ragge-wort is forcible unto; for they grow double, a greater and a smaller; the greater helps generation, the smaller hinders it. And this herb is called *Testiculus.* Some herbs are good for procreation of a male, and some of a female; as the herb which is called Marifica, and Fœminipara; both are like each other: the fruit of the Fœminipara is like the moss of an Olive-tree; the fruit of the Maripara is double like a mans stones. The fruit of white Ivy will make seed barren, but the fruit of Arsemery will make it fertile; which fruit is a small grain, like to Millet. The leaves of the herb Harts-tougue will make a man quite barren, if the herb it self be barren; for there is Harts-tongue that bears fruit, and this will make a man fruitful. It is a thing to be noted in a Bur, that a flower grows within the roughnesse and prickles of it, which doth not shew it self, but conceives and brings forth seed within it self; much like as Weasils and Vipers do: for they bring forth egges within themselves, and soon after bring forth young ones; so the Bur contains, and cherishes, and ripens the flower within it self, and afterward yeelds fruit. But these things have both the active and passive parts of generation. *Dioscorides* writeth, That the herb Scorpius resembleth the tail of the Scorpion, and is good against his bitings. So he saith, that the herb Dragon, both the greater and the less, is full of speckles like a Serpents backle, and is a remedy against their hurts: so the herb Arisaron in Egypt, and Wake-robin, and Garlick, bear seeds like a Snakes head; and so Buglosse and Orchanet bear seeds like a Vipers head; and these are good to heal their venemous bitings. Likewise Stone-crop and Saxifrage are good to break the stone in a mans bladder: and many other such things he there sets down. *Galen* saith, That the Lark hath a crested crown, of the fashion of the herb Fumitory, and that either of them is good against the Cholick. *Pliny* hath gathered into his books, many things out of the Antients works that were extant in his time. We will relate some of them. He saith, That an herb which grows in the head of an Image, being wrapt in a cloth, is good for the Head-ach. Many men have written of Holy-wort: it hath a flie-beetle in the stalk, that runs up and down in it, making a noise like a Kid, (whence it receives the name); and this herb is passing good for the voice. *Orpheus* found out by his wit, the properties of Stones. The stone Galactites, in colour like milk, if you cast the dust of it upon the back of a Goat, she will give milk more plentifully to her young; if you give it a nurse in her drink, it encreases her milk. Christal is like unto water; if one sick of an Ague keep it, and roul it in his mouth, it quenches his thirst. The Amethist is in colour like wine, and it keeps from drunkenness. In the stone Achates you may see fruits, trees, fields and medows; the powder of it cast about the horns or shoulders of Oxen as they are at plough, will cause great encrease of fruits. The stone Ophites resembleth the speckles and spots of Serpents, and it cures their bitings. If you dash the stone Galcophonos, it sounds like brass: stage-players are wont to wear it, because it makes one have an excellent voice. The stone Hematites being rubbed, is like blood, and is good for those that bleed, and for blood-shot eyes: and the stone Sinoper is of the same both colour and vertue. The residue I will not here set down, because I have handled them more at large, in that which I have written of the knowledge of Plants.

Chap. XII.

How to compound and lay things together, by this likeness.

We have shewed how that Nature layes open the likenesse of vertues and properties; now let us shew how to compound and lay those things together: for this is a principle of most use in this faculty, and the very root of the greatest part of secret and strange operations. Wherefore here thou must imitate the exact diligence of the Antients, studying to know how to apply

apply and lay things together with their likes, which indeed is the chief matter wherein the most secrecies do consist. It is manifest that every kind of things, and every quality can incline and draw, and allure some things to it, and make them become like it self: and as they are more active, so they more easily can perform it: as for example, fire being very active, doth more easily convert things into it self, and so water into water. *Avicenna* saith, That if any thing stand long in salt, it will become wholly salt; if in an unsavory vessel, it will become unsavory: he that converses with a bold man, shall be bold; if with a fearful man, he shall be fearful: and look what living creature converses among men, the same will be tame and gentle. Such positions are usual in Physick; as, All parts of the body, are nourished by their like, the brain by brains, teeth by teeth, lights by lights, and the liver by the liver. A mans memory and wit is holpen by a Hens brain; and her skull, if it be put into our meat whilst it is new, helps the falling-sicknesse; and her maw, if you eat it before supper, though you hardly digest it, yet is it good to strengthen the stomack. The heart of an Ape, takes away the palpitation of a mans heart, and encreaseth boldnesse, which is seated in the heart. A wolfs yard broiled and minced, is good to eat for the procuring of lust, when strength begins to fail. The skin of a Ravens heel is good against the Gout; the right-heel-skin must be laid upon the right-foot, if that be gouty; and the left upon the left: and finally, every member helps his like. But these things, Physitians write of, whose sayings it is not our purpose here to rehearse. Furthermore, we must consider and be well advised, what things such or such a quality is in; and whether it be there onely after a common sort, or else in some great measure; and whether it be an affection, or perturbation; and whether it come by chance, by art, or by nature; as for example, heating, cooling, love, boldnesse, barrennesse, fruitfulnesse, sadnesse, babling, or such like; and whether it can cause any such matter as we would work thereby: for examples sake: If you would make a woman fruiful, you must consider with your self the most fertile living-creatures; and amongst the rest, an Hare, a Cony, or a Mouse; for an Hare is bigge even after she hath broughe forth; she genders every month, and brings not forth all her young at once, but now and then one upon sundry daies, and presently goeth to buck again; and so conceives while she gives suck, and carries in her womb at once, one young that is ripe, another that hath no hairs, and a third that is but lately conceived. Again, you must consider the parts and members where that property lyeth, and minister them to your Patient: as, to make a woman fruitful, you must give her the womb and curd of an Hare; and to the man, the stones of an Hare. In like manner, any particular creature that was never sick, is a help against all diseases. If you would have a man become bold or impudent, let him carry about him the skin or eyes of a Lion or a Cock, and he will be fearlesse of his enemies; nay, he will be very terrible unto them. If you would have a man talkative, give him tongues, and seek out for him water-frogs, wilde-geese and ducks, and other such creatures, notorious for their continual noise-making; the tongues whereof, if you lay under the head or side of a woman as she is sleeping, because they are most clamorous in the evening, they will make her utter her night-secrecies. Other things we omit, as being superfluous and unprofitable here, seeing we have largely handled them in our books of plants.

CHAP. XIII.

That particular creatures have particular gifts; some in their whole body, others have them in their parts.

PArticular creatures are not destitute of excellent and strange properties, but are very powerful in operation, more then ordinarily their kind yields: and this is by reason either of some hidden property, or rather of the heavenly aspects and influences working diversly in divers particulars, as *Albertus* supposeth, and in one particular more then in most other of the same kind. These sundry effects and inclinations of such particulars, a Magician must also

also be well acquainted with; that knowing sundry ways whereby to work, he may make choice of the fittest, and such as may best serve his present use and need; for this is our task, to teach the way and method of searching out, and applying of secrecies; which done, no further thing can be required of us. Therefore to our purpose. *Albertus* saith, That there were once two twins, one of them would open doors and gates if he did but touch them with his side; and the other would shut them as fast when they were open. Some cannot away to look upon a Cat, a Mouse, and such like, but presently they swoon. So, many have the gift from heaven to heal the Kings-evil, and divers other sores: and that which hath troubled much, many Surgeons, and they could not heal it, hath at length been healed only with spittle. Again, we must well consider, what kinds of qualities are incident to what kinds of parties; as, commonly queans are impudent, ruffians are luxurious, theeves are fearful; and such like passions, as Writers everywhere mention. Moreover, some natural things have not only such properties in themselves, but they are apt also to communicate them unto others. A Harlot is not only impudent in her self, but she also naturally infects therewith, all that she touches and carries about her; so that if a man do often behold himself in her glasse, or put on her garments, it will make him impudent and lecherous as she is. The Load-stone doth not only draw to it self that iron which it touches, but also all iron things neer it; the same ring which the Load-stone draws to it self, will draw many rings if they be neer, so that it will be like a chain; the vertue of the Load-stone passing out of one ring into another. And the like may be observed in other things. We must note also, that the vertues of some things are seated in their whole substance; of other things, in some of their parts. The Sea-Lamprey stayeth a Ship, not principally with any one part, but with her whole body. And there be many like examples. On the other side, many things work by some of their parts; as the Cockatrice and the Basilisk, by their eyes; likewise Pismires shun the wings of a Rere-mouse, but her head and heart they do not shun; so they shun the heart of an Houpe, but neither the head, nor yet the wings. The like may be observed in other things.

Chap. XIV.

Of those properties and vertues which things have while they live; and of such as remain in things after death.

WE must consider that almost all those vertues which are found to be excellent in things while they are alive, do quite perish in death, and seldom are of any force afterward. If the wolf espy us, his eyes make us dumb; the eyes of the Cockatrice and Basilisk will kill us forth-right; the Sea-lamprey staies the course of a Ship; the Struthio-camelus can digest iron: but none of all the these being dead, worketh ought; for when they perish, their vertues also perish with them. Therfore it is a wise rule in natural Magick, that if a man will work any thing by living creatures, or by any of their parts or properties, he must take the benefit of them while they be alive; for if they die, their vertue dies also. For the soul, saith *Albertus*, is a chief help, and strikes a great stroke in those qualities which are in living creatures; so that they being alive, are endued with many operative vertues, which their death, (especially if it be natural, that their humours are quite wasted) takes from them, as Physitians do much observe. Draw out a frogs tongue, take away from the Ray or Fork-fish his dart, the eyes or stones out of any creatures head, or any such operative thing, not after they are dead, but while they are yet alive, and throw them into the water again, that if it be possible they may live still, lest their vertue should decay, but rather that by their living they might quicken those their natural properties, and so you may work better thereby. And thus we must do in all things else, which I spare to speak of any further. Sometimes yet the properties of things are operative, yea, and that more forcibly, after death. The

Wolf is hurtful and odious to sheep after he is dead: for if you cover a drum with a wolfs skin, the sound of it will make sheep afraid, when most other creatures will not be afraid; nay, sheep will make a heavy noise, whereas it contrariwise causeth such clamorous creatures as hear it, to hold their peace: so if you cover it with a bears skin, the sound thereof will make horses run away: and if you make harp-strings of all their guts severally, and put them together upon the instrument, they will alwayes jar, and never make any consort. The beast Hyæna, and the Panther, are naturally at variance; hence the skin of a dead Hyæna makes the Panther run away; nay, if you hang their severall skins one against the other, the Panthers skin will lose the hairs. So a Lions skin wasteth and eateth out the skins of other beasts; and so doth the wolfes skin eat up the Lambs skin. Likewise, the feathers of other fowles, being put among Eagles feathers, do rot and consume of themselves. The beast Florus, (it may be the Ass) and the bird Ægithus are at such mortal enmity, that when they are dead, their blood cannot be mingled together. The Pigeon loves the Kastrel so well, that she loves the Dove-house much the better, where a dead Kastrel is. In like manner, herbs, and other simples, retain many operative qualities, even after they are dried up. These things must be well considered by a Magician, lest peradventure he be deceived in their working.

CHAP. XV.

That all Simples are to be gotten and used in their certain seasons.

Seeing all inferiours, especially plants, receive their vertue from the heavens, therefore we must have a special care to take them in their due seasons: for as heaven varies the constitutions of the year, so doth it vary plants, they being much nourished by the temperature of the Air; and the time of the year, as *Theophrastus* saith, is all in all from them. Whence that proverb was justly fetcht, That it is the year, and not the field, which brings forth fruit. Which may be understood two wayes; either as the vulgar sort mean, or after a more peculiar manner. Concerning the vulgar understanding thereof, *Dioscorides* shews, that we must have a special care both to plant, and to gather all things in their right seasons; for they are operative onely, as their season is observed, but otherwise of no force. The time of gathering, must be a calm and fair time. If we gather them either too soon or too late, they loose their best vertue. Roots must be plucked up in the fall of the leaf, for then they are fullest, both of moisture and vertue; their force hiding it self within them when their leaves fall, which lasts long in them, being at that season gathered. Flowers must be gathered in the Spring, because then they have most vertue: and Leaves must be gathered in the Summer. The like we must observe in other things. Know also, that some things lose their vertue quickly, others keep it along time, as experience and the rules of Physick teach us; that some things may be kept many years, others being long kept, are good for nothing. Whence it cometh, that many experiments prove false, because that which we work by, happily hath lost his vertue, being kept too long. But there are certain peculiar times to gather them in (which the vulgar sort observeth not) wherein the heavenly constellations bestow upon them some singular vertue, proceeding from the most excellent nature and quality of the stars: in which times if they be gathered, they are exceedingly operative. But there can be no set and just time assigned, by reason of the divers situations of divers places in respect of the Sun; for as the Sun-beams come neerer or further off, so the earth fructifies sooner or later: yet we will give some general observations. Roots are to be gathered betwixt the old Moon and the new; for then the moisture is fallen into the lower parts, and that in the Evening; for then the Sun hath driven in the moisture, and by the stalk it is conveyed down into the root. The time serves well to gather them, when their wrinkles be filled out with moisture, and they chap because they have so much juice, as if they were about to break in pieces. Leaves are then to be gathered, as soon as they have opened themselves out of the sprigs; and that in the morning about Sun-rising; for then they are moister then in the

the evening, the Suns heat having drunk up their moisture all day long. Flowers are then to be gathered, when they begin to seed, while their juice is in them, and before they wax limber. Stalks are then to be gathered, when the flower is withered; for then especially are they profitable. And seeds must be then gathered, when they are so ripe that they are ready to fall. There are some more peculiar observations. Hot and slender herbs should be gathered when Mars and the Sun are Lords of the celestial houses; moist herbs, when the Moon is Lord; but you must take heed that you gather them not in the falling houses thereof. These things well observed in gathering plants, will make them very profitable for Physical uses.

Chap. XVI.

That the Countries and places where Simples grow, are chiefly to be considered.

MAny are deceived in plants, and metals, and such like, because they use them that come next hand, never heeding the situation of the place where they grow. But he that will work soundly, must well consider, both the aspect of the heavens, and the proper nature and situation of the place; for the place works diversly in the plants, according to his own divers temperatures; and sometimes causeth such an alteration in the vertues of them, that many, not onely young Magicians, but good Physitians and Philosophers too, have been deceived in searching them out. *Plato* makes mention hereof: God (saith he) hath furnished the places of the earth with divers vertues, that they might have divers operations into plants and other things according to their kind. And so *Porphyry* saith, that the place is a principle of a generation, as a father is. *Theophrastus* would have Hemlock gathered and fetch'd from *Susa*, because *Thrasias* was of opinion, that there it might safely be taken, and in other very cold places: for whereas in Athens the juice of it is poison, odious amongst the Athenians, because it is given to kill men in common executions; and *Socrates* there taking it, died presently; yet here it is taken without danger, and beasts feed upon it. The herb called Bears-foot, that which grows on the Hill Oeta and Parnassus, is very excellent; but elsewhere, of small force: therefore *Hippocrates*, when he would cure *Democritus*, he caused it to be fetch'd from the Hills. And in Achaia, especially about Cabynia, there is a kind of Vine, as *Theophrastus* saith, the wine whereof causeth untimely births; and if the dogs eat the grapes, they will bring forth abortives: and yet in the taste, neither the wine, nor the grape, differ from other wines and grapes. He saith also, that those Physicall drugs which grow in Eubœa, neer unto Æge, are good; but neer to Telethrium, which is a shadowed and waterish place, they are much worse and drier. In Persia there grows a deadly tree, whose apples are poison, and present death; therefore there it is used for a punishment: but being brought over to the Kings into Egypt, they become wholesome apples to eat, and lose their harmfulnesse, as *Columella* writes. *Dioscorides* saith, That the drugs which grow in steep places, cold and dry, and open to the winde, are most forcible; but they that grow in dark, and waterish, and calm places, are lesse operative. Wherefore if we find any difference in such things, by reason of the places where they grow, that they have not their right force, we must seek them out there where the place gives them their due vertue.

Chap. XVII.

Certain properties of Places and Fountains, which are commodious for this work.

DIfference of places, works much in the different effects of things. For the place of the waters, and also of the earth, hath many miraculous vertues, which a Magician must needs be well acquainted with: for oft-times we see, that some things are strangely operative, onely by reason of the situation of the place, the disposition of the Air, and the force of the Sun, as it cometh nearer or further off. If one

one ground did not differ from another, then we should have odoriferous reeds, rushes, grasse, frankincense, peper, and myrrh, not only in Syria and Arabia, but in all other Countries also. Likewise many properties are derived out of Waters and Fountains; which otherwise could not be made, but that the waterish humor in the earth, conveys his scent and such like properties, into the root of that which there groweth, and so nourisheth up that matter which springs out, and causeth such fruit as savours of the place, according to his own kind. Zama is a City in Africa, and Ismuc is a Town twenty miles from it: and whereas all Africk besides, is a great breeder of beasts, especially of serpents, about that Town there breed none at all; nay, if any be brought thither, it dies: and the earth of that place also killeth beasts, whithersoever it is carried. In the great Tarquine Lake of Italy, are seen Trees, some round, some triangle, as the wind moves them; but none four-square. In the Country beyond the River Po, that part which is called Monsterax, there is a kind of Corn called Siligo, which being thrice sown, makes good bread-corn. Neer to Harpasum a Town of Asia, there is a huge Rock, which if you touch with one finger, will move; if with your whole body, it will not move. There are some places of the earth that are full of great fires, as Ætna in Sicily, the Hill Chimæra in Phaselis; the fire whereof *Ctesias* writes, will be kindled with water, and quencht with earth. And in the Country of Megalopolis, and the fields about Arcia, a coal falling on the earth, sets it on fire. So in Lycia, the Hills Ephesti being touched with a Torch, flame out, insomuch that the stones and sands there do burn in the waters; wherein if a man make a gutter with a staff, he shall see Rivers of fire run therein. The like things are reported of waters. For seeing they passe under the earth, through veins of allum, pitch, brimstone, and such like; hence it is that they are sometimes hurtful, and sometimes wholsome for the body. There are also many kinds of water, and they have divers properties. The River Himera in Sicily, is divided into two parts: that which runs against Ætna, is very sweet, that which runneth through the salt vein, is very salt. In Cappadocia, betwixt the Cities Mazaca, and Tuava, there is a Lake, whereinto if you put reeds or timber, they become stones by little and little, and are not changed from stones again, neither can any thing in that water be ever changed. In Hierapolis, beyond the River Mæander, there is a water that becomes gravel, so that they which make water-courses, raise up whole banks thereof. The Rivers Cephises and Melas in Bœotia, if cattel drink of them, as they do continually to make them conceive, though the dams be white, yet their young shall be russet, or dun, or coal-black. So the sheep that drink of the River Peneus in Thessaly, and Astax in Pontus, are thereby made black. Some kinds of waters also are deadly, which from the poisonous juice of the earth become poisonous; as the Well of Terracina called Neptunius, which kills as many as drink of it; and therefore in old times it was stopt up. And the Lake Cychros in Thracia, kills all that drink of it, and all that wash themselves with it. In Nonacris, a Country of Arcady, there flow very cold waters out of a stone, which are called the water of Styx, which break to pieces all vessels of silver and brasse; and nothing can hold them but a Mules hoof, wherein it was brought from *Antipater*, into the Country where *Alexander* was, and there his Son *Jolla* killed the King with it. In the Country about Flascon, the way to Campania, in the field Cornetum, there is a Lake with a Well in it, wherein seem to lie the bones of Snakes, Lysards, and other Serpents; but when you would take them out, there is no such thing. So there are some sharp and sowre veins of water, as Lyncesto, and Theano in Italy; which I sought out very diligently, and found it by the way to Rome, a mile from Theano; and it is exceeding good against the Stone. There is a Well in Paphlagonia, whosoever drinks of it, is presently drunken. In Chios is a Well, that makes all that drink of it, sottish and senslesse. In Susa is a Well, whoso drinks of it, loseth his teeth. The water of Nilus is so fertile, that it makes the clods of earth to become living creatures. In Æthiopia is a Well, which is so cold at noon, that you cannot drink it; and so hot at midnight, that you cannot touch it. There are many other like Wells, which *Ovid* speaks of: *Ammons* Well is cold all day, and warm both morning and evening: the waters of Athamas, set wood on fire, at the small of the

Moon:

Moon: there is a Well where the Cicones inhabit, that turneth into stones all that toucheth it, or drinks of it; Crathis and Sybaris make hair shew like Amber and Gold; the water of Salmax, and the Æthiopian Lakes, make them mad or in a trance that drink of it; he that drinks of the Well Clitorius, never cares for wine after; the River Lyncestius makes men drunken; the Lake Pheneus in Arcady, is hurtful if you drink it by night; if by day, it is wholesome. Other properties there are also of places and fountains, which he that would know, may learn out of *Theophrastus*, *Timæus*, *Possidonius*, *Hegesias*, *Herodotus*, *Aristides*, *Metrodorus*, and the like, who have very diligently sought out, and registred the properties of places; and out of them, *Pliny*, *Solinus*, and such Writers have gathered their books.

Chap. XVIII.

That Compounds work more forcibly; and how to compound and mix those Simples which we would use in our mixtures.

Now we will shew how to mix and compound many Simples together, that the mixture may cause them to be more operative. *Proclus* in his book of Sacrifice and Magick, saith, That the antient Priests were wont to mix many things together, because they saw that divers Simples had some property of a God in them, but none of them by it self sufficient to resemble him. Wherfore they did attract the heavenly influences by compounding many things into one, whereby it might resemble that One which is above many. They made images of sundry matters, and many odors compounded artificially into one, so to expresse the essence of a God, who hath in himself very many powers. This I thought good to alleadge, that we may know the Ancients were wont to use mixtures, that a compound might be the more operative. And I my self have often compounded a preservative against poison, of Dragon-herbs, the Dragon-fish, Vipers, and the stone Ophites; being led therein by the likenesse of things. The herb Dragon-wort, both the greater and smaller, have a stalk full of sundry-coloured specks: if any man eat their root, or rub his hands with their leaves, the Viper cannot hurt him. The Dragon-fish being cut and opened, and laid to the place which he hath stung, is a present remedy against his sting, as *Ætius* writes. The Viper it self, if you flay her, and strip off her skin, cut off her head and tail, cast away all her intrails, boil her like an Eele, and give her to one that she hath bitten, to eat, it will cure him: or if you cut off her head being alive, and lay the part next the neck, while it is hot, upon the place which she hath bitten, it will strangely draw out the poyson. Many such compound medicines made of creatures living on the earth, in the water, in the air, together with herbs and stones, you may find most wittily devised, in the books of *Kirannides* and *Harprocration*. But now we will shew the way and manner how to compound Simples, which the Physitians also do much observe. Because we would not bring forth one effect only, but sometimes have use of two or three, therefore we must use mixtures, that they may cause sundry effects. Sometime things will not work forcibly enough, therefore to make the action effectual, we must take unto us many helps. Again, sometime they work too strongly, and here we must have help to abate their force. Oft-times we would practice upon some certain member, as the head, the heart, or the bladder; here we must mingle some things which are directly operative upon that part, and upon none else; whereby it falleth out, that sometimes we must meddle contraries together. But to proceed. When you would do any work, first consider what is the chief thing which your simple or compound should effect; then take the ground or foundation of your mixture, that which gives the name to your compound, and let there be so much of it, as may proportionably work your intent; for there is a just and due quantity required for their working: then put in the other ingredients, as sauce and seasoning, to help the principal to work more easily and in due time. So we mingle sweet things with unsavory, and with bitter, that it may smell and taste well: for if we should mingle onely unsavoury and bitter receits, they that we give it unto would loath it, and their animal spirits would so abhor it, that though they took

it,

it, yet it could not work in them. So we meddle soft and hard things together, that they may go down more pleasantly. Sometimes there is so little in a receit, that the heat of the body wastes it before it can work; here then is required a greater quantity: for, this doth not hinder the working, but gives the natural heat somewhat to feed upon, that in the mean space the receit may have fit time to work. As for example: If we would catch birds by bringing them to sleep, here we must take the Nut Methella, which is of that force, as to cause sleep and heavines of brain; and let this be the ground of our mixtion: then to make it more lively in working, put thereto the juice of black Poppie, and the dregs of wine: If it be too hard, and we would have it more liquid, that so it may fill out the pulse or other baites which we lay for them; put thereto the juice of Mandrakes, and Hemlock, and an Ox gall: and that it may not be bitter or unsavoury, put hony, cheese or floure amongst it, that so it may be fitter to be eaten: and when once the birds have tasted of it, they lie down to sleep on the ground, and cannot flie, but may be taken with hands. The like must be observed in other things.

CHAP. XIX.

How to find out the just weight of a mixture.

WE must also have a special care to know the right ministring of a compound, and how to find out the just proportion of weight therein; for the goodness of the operation of things, consists chiefly in the due proportion and measure of them: And unless the mixtion be every way perfect, it availeth little in working. Wherefore the Antients were wont to observe not only in compounds, but also in Simples due weight and measure; and their experience hath left it unto us. If then thou bestowest thy pains in this faculty, first thou must find out the weight of a simple Medicine, how much of it would serve such a purpose as thou intendest; and to that, thou must proportionably frame thy compound, observing a due proportion, both in the whole and every part thereof. Let thy chief Simple, the ground of thy mixture, be half the weight, and the other ingredients altogether must be the other half; but how much of each of these other ingredients, that thou must gather by thy own conjecture: So then, thy whole compound must be but as much as if it were onely a simple receit; for we do not compound things, to make the receit greater, either in quantity or in vertue, but only because it should be more speedy in operation: It must also be considered, that the weights of mixtures and medicines must vary proportionably, as the Countries and Climates vary: for this alters their operation, as we shewed before. Thou must therefore work advisedly; and as the operation of the Simples altereth, so thou must alter their weight, by putting to, and taking from, and wittily fitting all things, that they may effect that which thou wouldest. This is the reason, why in our experiments which we have set down hereafter, we have described the parts thereof by their several weights: and lest the divers names of weights should hinder thy working, we have used those weights and names which *Cornelius Celsus* used before us: for so it is fittest for all mens satisfaction.

CHAP. XX.

How to prepare Simples.

HAving shewed the way how to compound and find out the just weight of our composition, it now remains we teach how to prepare Simples; which is a matter chiefly necessary for this work; and greatest skill is seen in it. For the operations of Simples, do not so much consist in themselves, as in the preparing of them; without which preparation, they work little or nothing at all. There be many wayes to prepare Simples, to make them fitter for certain uses. The most usual wayes are, Steeping, Boiling, Burning, Powning, Resolving into ashes, Distilling, Drying, and such like. To macerate or steep any thing, is to drench and to soak

soak it in liquor, that it may be throughly wet both within and without, so that the more subtil and intimate part of it may be drained and squeezed out, and the grosser and earthly part be left behind, to receive that humour in the very middle, which we would have in it. Boiling we then use, when we cannot otherwise well get out the juice of any thing: for by boiling we draw out of the centre into the circumference, when we cannot do it by steeping; though thereby the slighter vapours may be resolved. So we use to burn, to roste, to pown things, that we may take away all their moisture from them; for by this means, they may the more easily be resolved, and the sooner converted into liquor, and the better mingled with other things to be put to them. So we roste or broil things when otherwise we cannot break them, that they might become dust; yet alwayes we must take heed that we do not so burn them, as they may lose their strength; nor so boil things but only as they may be fitter to receive that subtil humor and quality, which we would convey into them. Distillation of things is used, as well to get out water that may be of greater strength, therby to work more easily & handsomly; as also because the slighter and more subtile parts of Medicines are fittest for us, the grosser parts must be cast away, as being an hindrance to our purpose: and the like we must conceive of other operations. These things I thought fittest for this work. He that would be instructed more at large herein, let him look into the books of Physitians. But let us now proceed to further matters.

THE SECOND BOOK OF Natural Magick:

Shewing how living Creatures of divers kinds, may be mingled and coupled together, that from them, new, and yet profitable kinds of living Creatures may be generated.

The Proeme.

Having wandred beyond my bounds, in the consideration of Causes and their Actions; which I thought fit to make the Subject of my first book: it will be time to speak of those Operations, which we have often promised, that we may not too long keep off from them those ingenious men that are very desirous to know them. Since that we have said, That Natural Magick is the top, and the compleat faculty or Natural Science, in handling it, we will conclude within the compass of this Volume, whatsoever is High, Noble, Choice, and Notable, that is discovered in the large field of Natural History. But that we may perform this, I shall reduce all those Secrets into their proper places; and that nothing may be thrust out of its own rank, I shall follow the order of Sciences. And I shall first divide them into Natural and Mathematical Sciences; and I shall begin with the Natural; for I hold that most convenient, that all may arise from those things that are simple, and not so laborious, to Mathematical Sciences. I shall from Animals first proceed to Plants, and so by steps to Minerals, and other works of Nature. I shall briefly describe Fountains, also whence flow Springs; and I shall annex thereto the Reasons, and the Causes; that Industrious men made acquainted with this, may find out more of themselves. And because there are two generations of Animals and Plants, one of themselves, the other by copulation: I shall first speak of such as are bred without copulation; and next, of such as proceed from copulation one with another, that we may produce new living Creatures, such as the former ages never saw. I shall begin therefore with Putrefaction, because that is the principle to produce new Creatures; not onely from the variety of Simples, but of mixed Bodies. I thought fit to leave none out, though they be of small account, since there is nothing in Nature, appear it never so small, wherein there is not something to be admired.

Chap. I.

The first Chapter treateth of Putrefaction, and of a strange manner of producing living Creatures.

Before we come to shew that new living Creatures are generated of Putrefaction, it is meet to rehearse the opinions of antient Philosophers concerning that matter. Whereof though we have spoken elsewhere, in the description of Plants, yet for the Readers ease, we will here rehearse some of them, to shew that not onely imperfect, but perfect living Creatures too, are generated of Putrefaction. *Porphyry* thought that Living creatures were begotten of the bowels of the Earth soaked in water, and quickned by the heat of the Sun. Of the same mind were *Archelaus* the Athenian, *Anaxagoras Clazomenius*, and *Euripides* his Scolar. *Cleodemus*, and after him *Theophrastus*, thought that they came of putrified water

ter mixt with earth; and the colder and fouler the water was, the unfitter it was for their generation. *Diodorus*, and many other good Philosophers hold, that all living Creatures did arise of putrefaction. For whereas in the beginning of the world, the Heavens, and Earth, and Elements were setled in their natural places, the earth being left slimy and soft in many places, and then dried and stricken with the heat of the Sun, brought forth certain tumors and swellings in the surface and uppermost parts: in these tumors were contained and cherished many putrefactions and rotten clods, covered over with certain small skins; this putrified stuff, being moistened with dew by night, and the Sun heating it by day, after a certain season became ripe; and the skins being broken, thence issued all kinds of living Creatures; whereof, they that had quickest heat, became birds; the earthy ones became creeping beasts; the waterish ones became fishes in the Sea; and they which were a mean, as it were, betwixt all these, became walking-creatures. But the heat of the Sun still working upon the earth, hindered it from begetting and bringing forth any more such creatures; but then, the creatures before generated coupled together, and brought forth others like themselves. *Avicenna*, in that work of his which he made of deluges and floods; holds, that after the great floods that drowned the Earth, there was no mans seed; but then, man, and all living Creatures else, were generated of rotten carcases, only by the vertue of the Sun: and therefore he supposeth, that the womb, and such needful places framed by nature, for the better fashioning of the infant, are not needfull to the procreation of man. He proves his assertion by this, that mice, which arise of putrefaction, do couple together, and beget store of young; yea, and serpents are generated chiefly of womans hair. And in his book of living Creatures, he tels of a friend of his, that brought forth Scorpions after a strange manner, and those did beget other Scorpions, not imperfect, or unlike to themselves, but such as did also procreate others. *Averroes* held, that the stars were sufficient to generate imperfect creatures; as mice, bats, moules, and such like, but not to generate Men, or Lions. And daily experience teacheth us, that many living creatures come of the putrified matter of the earth. And the Ancients supposing all things to be produced out of the earth, called it the mother of all; and the Greeks called it Dimitera. *Ovid* hath very elegantly set down this generation of putrefaction, under the fable of *Pytho*; that the earth brought forth of its own accord, many living creatures of divers forms, the heat of the Sun enliving those moistures that lay in the tumors of the earth, like fertile seeds in the belly of their mother; for heat and moisture being tempered together, causeth generation. So then, after the deluge, the earth being now moist, the Sun working upon it, divers kinds of creatures were brought forth, some like the former, and some of a new shape.

Chap. II.

Of certain earthly Creatures, which are generated of putrefaction.

PLants and living Creatures agree both in this, that some of them are generated of seed, and some of them Nature brings forth of her own accord, without any seed of the same kind; some out of putrified earth and plants, as those Creatures that are divided between the head and the belly; some out of the dew that lies upon leaves, as Canker-worms; some out of the mud, as shel-creatures; and some out of living Creatures themselves, and the excrements of their parts, as lice. We will onely rehearse some which the Ancients have set down, that so we may also learn how to procreate new creatures. And first, let us see, how

Mice are generated of putrefaction.

Diodorus saith, that neer to the City Thebais in Egypt, when Nilus overflowing is past, the Sun heating the wet ground, the chaps of the earth send forth great store of mice in many places; which astonisheth men to see, that the fore-part of the mice should live and be moved, whereas their hinder parts are not yet shapen. *Pliny* saith, that after the swaging of Nilus, there are found little mice begun to be made of earth and water, their fore-parts living, and their hinder parts being nothing but earth. *Ælianus* saith, that a little rain in Egypt, engenders many mice, which being scattered everywhere in their fields, eat down their corn, and devour it: And so it is in Pontus; but by their prayers to God, they are consumed. *Macrobius* and *Avicenna* say, that the mice so generated, do encrease exceedingly by coupling together. *Aristotle* found out, that a kind of field-mice encreased wonderfully; so that in some places they did suddenly eat up whole fields of corn: insomuch that many Husband-men appointing to reap their corn on the morrow, when they came with their reapers, found all their corn wasted. And as these mice are generated suddenly, so they are suddenly consumed, in a few dayes; the reason whereof cannot be so well assigned. *Pliny* could not find how it should be; for neither could they be found dead in the fields, neither alive within the earth in the winter time. *Diodorus* and *Ælianus* write, That these field-mice have driven many people of Italy out of their own Countrey: they destroyed Cosas, a City of Hetruria: many came to Troas, and thence drove the inhabitants. *Theophrastus* and *Varro* write, That mice also made the inhabitants of the Island Gyarus to forsake their Country; and the like is reported of Heraclea in Pontus, and of other places. Likewise also

Frogs are wonderfully generated of rotten dust and rain;

for a Summer showre lighting upon the putrified sands of the shore, and dust of high-wayes, engenders frogs. *Ælianus*, going from Naples in Italy, to Puteoli, saw certain frogs, that their fore-parts moved and went upon two feet, while yet their hinder parts were unfashioned, and drawn after like a clot of dirt: and *Ovid* saith, one part lives, the other is earth still: and again, mud engenders frogs that sometimes lack feet. The generation of them is so easie, and sudden, that some write it hath rained frogs; as if they were gendred in the Air. *Phylarchus* in *Athenaeus* writes so; and *Heraclides Lembus* writes, that it rained frogs about Dardany and Pœonia, so plentifully, that the very wayes and houses were full of them: and therefore the inhabitants, though for a few daies at the first they endured it, killing the frogs, and shutting up their houses, yet afterward when they saw it was to no purpose, but they could neither use water, nor boil meat, but frogs would be in it, nor so much as tread upon the ground for them, they quite forsook their countries, as *Diodorus* and *Eustathius* write. The people Autharidæ in Thespratia, were driven out of their Country, by certain imperfect frogs that fell from heaven. But it is a strange thing that

Red Toads are generated of dirt, and of womens flowers.

In Dariene, a Province of the new world, the air is most unwholesome, the place being muddy and full of stinking marishes; nay, the village is it self a marish, where Toads are presently gendred of the drops wherewith they water their houses, as *Peter Martyr* writes. A Toad is likewise generated of a duck that hath lyen rotting under the mud, as the verse shews which is ascribed to the duck; When I am rotten in the earth, I bring forth Toads: happily because they and I both, are moist and foul creatures. Neither is it hard to generate Toades of womens putrified flowers; for women do breed this kind of cattel, together with their children, as *Celius Aurelianus* and *Platearius* call them, frogs, toads, lyzards, and such like: and the women of Salerium, in times past, were wont to use the juice of Parsley and Leeks, at the beginning of their conception, and especially about the time of their quickening, thereby to destroy this kind of vermin with them. A certain

woman lately married, being in all mens judgement great with child, brought forth in stead of a child, four Creatures like to frogs, and after had her perfect health. But this was a kind of a Moon-calf. *Paracelsus* said, that if you cut a serpent in pieces, and hide him in a vessel of glasse, under the mud, there will be gendred many worms, which being nourished by the mud, will grow every one as big as a Serpent; so that of one serpent may be an hundred generated: and the like he holds of other creatures. I will not gainsay it, but only thus, that they do not gender the same serpents. And so, he saith, you may make them of a womans flowers; and so, he saith, you may generate a Basilisk, that all shall die which look upon him: but this is a stark lie. It is evident also, that

Serpents may be generated of mans marrow, of the hairs of a menstruous woman, and of a horse-tail, or mane.

We read, that in Hungary, by the River Theisa, Serpents and Lyzards did breed in mens bodies, so that three thousand men died of it. *Pliny* writes, that about the beginning of the wars against the Marsi, a maid-servant brought forth a serpent. *Avicenna* in his book of deluges, writes, that serpents are gendred of womens hairs especially, because they are naturally moister and longer then mens. We have experienced also, that the hairs of a horses mane laid in the waters, will become serpents: and our friends have tried the same. No man denies but that serpents are easily gendred of mans flesh, especially of his marrow. *Ælianus* saith, that a dead mans back-marrow being putrified, becomes a serpent: and so of the meekest living Creature arises the most savage: and that evil mens back-bones do breed such monsters after death; *Ovid* shews, that many hold it for a truth. *Pliny* received it of many reports, that Snakes gendred of the marrow of mens backs. Writers also shew,

How a Scorpion may be generated of Basil.

Florentinus the Grecian saith, That Basil chewed and laid in the Sun, will engender serpents. *Pliny* addeth; that if you rub it, and cover it with a stone, it will become a Scorpion; and if you chew it, and lay it in the Sun, it will bring forth worms. And some say, that if you stamp a handful of Basil, together with ten Crabs or Crevises, all the Scorpions thereabouts will come unto it. *Avicenna* tells of a strange kind of producing a Scorpion; but *Galen* denies it to be true. But the body of a Crab-fish is strangely turned into a Scorpion: *Pliny* saith, that while the Sun is in the sign Cancer, if the bodies of those fishes lie dead upon the Land, they wil be turned into Scorpions. *Ovid* saith, if you take off the Crabs arms, and hide the rest in the ground, it will be a Scorpion. There is also a

Creature that lives but one day, bred in vineger;

as *Ælianus* writes; and it is called Ephemerus, because it lives but one day: it is gendred of the dregs of sowre wine; and as soon as the vessel is open, that it comes into the light, presently it dies. The River *Hippanis*, about the solstitial daies, yields certain little husks, whence issue forth certain four-footed birds, which live and flie about till noon, but pine away as the Sun draws downward, and die at the Sun-setting; and because they live but one day, they are called Hemerobion, a daies-bird. So the

Pyrigones be generated in the fire;

Certain little flying beasts, so called, because they live and are nourished in the fire; and yet they flie up and down in the Air. This is strange; but that is more strange, that as soon as ever they come out of the fire, into any cold air, presently they die. Likewise the

Salamander

Salamander is gendred of the water;

for the Salamander it self genders nothing, neither is there any male or female amongst them, nor yet amongst Eeels, nor any kind else; which doth not generate of themselves either egge or young, as *Pliny* noteth. But now we will speak of a most excellent generation, namely, how

Bees are generated of an Ox.

Ælianus writes, That Oxen are commodious many wayes; amongst the rest, this is one excellent commodity, that being dead, there may be generated of them a very profitable kind of Creatuers, namely Bees. *Ovid* saith it, that as all putrified bodies are turned into some small living Creatuers, so Oxen putrified do generate Bees. *Florentinus* the Grecian saith, that *Jubas* King of Africa, taught how to make Bees in a wooden Ark. *Democritus* and *Varro* shew a cruel manner of making Bees in a house: but it is a very ready way. Chuse a house ten cubits high, and ten cubits broad, square every way: but let there be but one entrance into it, and four windows, on each side one. Put in this room an Ox, about two or three years old; let him be fat and fleshy: then set to him a company of lusty fellows, to beat him so cruelly, that they kill him with their cudgels, and break his bones withal: but they must take great heed that they draw no blood of him, neither must they strike him too fiercely at the first: After this, stop up all the passages of the Ox, his nostrils, eyes, mouth, and necessary places of evacuation, with fine linen clouts besmeared with pitch: Then cast a great deal of honey under him, being laid with his face upwards, and let them all go forth, and daube up the door and the windows with thick lome, so that no wind, nor Air can get in. Three weeks after, open the room, and let the light and the Air come in, except there where the wind would blow in too violently. And when you see that the matter is through cold, and hath taken air enough, then shut up the door and windows as before. About eleven daies after, open it again, and you shall find the room full of Bees clotted together, and nothing of the Ox remaining, beside the horns, the bones and the hair. They say that the Kings of the companies are generated of the brain, the other of the flesh, but the chief Kings of all, of the marrow; yet those that come of the brain, are most of them greater, handsomer, and better-coloured then the rest. When you open the room first, you shall find the flesh turned into small, white, and unperfect creatures, all of the same shape, but as yet only growing, and not moving. Afterward, at the second opening, you may see their wings grown, the right colour of Bees in them, and how they sit about their Kings, and flutter about, especially toward the windows, where they would enjoy their desired light. But it is best to let them light by the windows every other day. This same experiment, *Virgil* hath very elegantly set down in the same manner. Now as the best kind of Bees are generated of a young Ox, so a more base kind of them is brought forth of the dead flesh of baser creatures; *Ælianus* saith,

That Waspes are generated of an Horse;

when his carcase is putrified, the marrow of him brings forth Waspes; a swift kind of fowl, from a swift kind of beast. *Ovid* saith, that Hornets are thence generated; and *Isiodore* derives *crabronem à cabo, id est caballo*, a hornet of a horse, because they are brought forth of horses. *Pliny* and *Virgil* say, that waspes and hornets both, are generated of the flesh of dead horses. In like manner

Drones come of Mules,

as

as *Isiodore* affirmeth: and the Drone is called *Fucus quasi Fagos*, because he eats that which he never laboured for. But others hold that Locusts, and not Drones, are generated of Mules flesh. So also, of the basest beast cometh the basest fowl:

The Beetle is generated of the Ass,

as *Pliny* writes. *Isiodore* saith, they come of swift dogs: *Ælianus* saith, they have no female, but lay their seed in a clot of earth for 28 dayes, and then bring forth young out of it.

Chap. III.

Of certain Birds, which are generated of the Putrefaction of Plants.

Olaus Magnus, in the description of the North-countries of Europe, reports, that about Scotland, there be certain birds generated of the fruit of a Tree. *Munster* saith, there be certain Trees which bring forth a fruit covered over with leaves; which, if it fall into the water under it, at the right season, it lives, and becomes a quick bird, which is called *Avis arborea.* Neither is this any new tale; for the antient Cosmographers, especially *Saxo Grammaticus* mentions the same Tree. Late Writers report, That not onely in Scotland, but in the River of Thames also by London, there is a kind of Shel-fish in a two-leaved shell, that hath a foot full of plaits and wrinkles: these fish are little, round, and outwardly white, smooth and brittle shelled, like an Almond shell; inwardly they are great bellied, bred as it were of moss and mud: they commonly stick on the keel of some old Ship, where they hang together like Mushrome-stalks, as if they were thereby nourished. Some say, they come of worms, some of the boughs and branches of Trees which fall into the Sea; if any of these be cast upon shore, they die; but they which are swallowed still into the Sea, live, and get out of their shell, and grow to be ducks or such like birds. *Gesner* saith, that in the Islands Hebrides, the same

Birds are generated of putrified wood.

If you cast wood into the Sea, first after a while there will certain worms breed in it, which by little and little become like ducks, in the head, feet, wings and feathers; and at length grow to be as big as Geese: and when they are come to their full growth, they flie about in the Air, as other birds do. As soon as the wood begins first to be putrified, there appears a great many wormes, some unshapen, others being in some parts perfect, some having feathers, and some none. *Paracelsus* saith; As the yelk and white of an egge, becomes a chick by the heat of an Hen; so a bird burnt to ashes, and shut up in a vessel of glass, and so laid under the mixen, will become a slimy humour; and then, if it be laid under a Hen, is enlived by her heat, and restored to her self like a Phœnix. *Ficinus* reporteth, and he had it out of *Albertus*, That there is a certain bird, much like a Black-bird, which is generated of the putrefaction of Sage; which receives her life and quickning from the general life of the whole world.

Chap. IV.

Of Certain fishes which are generated of putrefaction.

Having first spoken of earthly Creatures, and then of Fowles; now we will speak of Fishes so generated. And first how

Eeles are generated.

Amongst them there is neither male or female, nor egges, nor any copulation; neither

ther was there ever seen in any of them, any passage fit to be a womb. They have bred oft-times in certain muddy pools, even after all the water and mud hath been gone; only by rain-water: neither indeed do they ever breed without rain, though they have never so much water otherwise; for it is the rain, both that begets and nourishes them, as *Aristotle* writes. They are also generated of putrified things. Experience hath proved, that a dead horse thrown into a standing pool, hath brought forth great store of Eeles; and the like hath been done by the carcases of other creatures. *Aristotle* saith, they are generated of the garbage of the earth, which he saith, ariseth in the Sea, in Rivers, and in pools, by reason chiefly of putrefaction; but it arises in the Sea by reason of reeds; in Pools and Rivers, it arises by the banks-side, for there the heat is more forcible to cause putrefaction. And a friend of mine filled certain wooden vessels with water, and Reeds, and some other water-herbs, and set them in the open Air, having first covered them with a weighty stone, and so in short time generated Eeles. Such is the generation of

Groundlings out of some and froth,

which fish the Greeks call Aphya, because rain breeds it. Many of them breed of the fome that rises out of the sandy chanel, that still goes and comes at all times, till at last it is dissolved; so that this kind of fish breeds all times of the year, in shadowy and warm places, when the soyl is heated; as in Attica, neer to Salamnia, and in Marathon, where *Themistocles* got his famous victory. In some places, this fish breeds of fome by the help of the rain; and swims on the top of the water in the fome, as you see little wormes creep on the top of mud. *Athenæus* saith, This fish is consecrated to Venus, because she also comes of the froth of the Sea, whence she is called Aphrodites. *Ælianus* saith, These fishes neither do beget, nor are begotten, but only come of mud: for when dirt is clotted together in the Sea, it waxes very black and slimy, and then receives heat and life after a wonderful manner, and so is changed into very many living Creatures, and namely into Groundlings. When the waves are too boistrous for him, he hides himself in the clift of some rock; neither doth he need any food. And *Oppianus* makes the very same description of them, and of their generation. There is a kind of these fishes, called a Mullet-Groundling, which is generated of mud and of sand, as hath been tried in many marish places, amongst the rest in Gindus; where in the Dog-daies, the Lakes being dried up, so that the mud was hard; as soon as ever they began to be full of rain-water again, were generated little fishes, a kind of Mullets, about the bigness of little Cackrels, which had neither seed nor egge in them. And in some parts of Asia, at the mouth of the Rivers into the Sea, some of a bigger size are generated. And as the Mullet-groundling comes of mud, or of a sandy lome, as *Aristotle* writes; so it is to be thought, that the Cackrel-groundling comes thereof also. It seems too, that

A Carpe is generated of putrefaction,

Especially of the putrified mud of sweet water: for it is experienced, that in certain Lakes, compassed about with Hills, where there is no Well, nor River, to moisten it, but only the rain, after some few showers, there hath been great store of fish, especially Carps: but there are some of this kind generated by copulation. There are also in certain particular Lakes, particular kinds of fishes, as in the Lemane, and the Benacian Lakes, there be divers kind of Carpes, and other such fishes. Likewise there are certain

Earthly fishes generated of putrefaction.

Pliny reports, that in Paphlagonia, they dig out of deep ditches, certain earthly fishes very good to be eaten; and it is so in places where there is no standing water; and he wonders that they should be generated without copulation: but surely

ly it is by vertue of some moisture, which he ascribes to the Wells, because in some of them fishes are found. Likewise

Shel-fish are generated of the frothy mud,

or else meerly of the salt-water; for they have neither seed, nor male, nor female; the hardnesse and closenesse of their shels, hindering all things from touching or rubbing their inward parts, which might be fit for generation. *Aristotle* saith, they breed all of themselves; which appears by this, that oft-times they breed in Ships, of a forthy mud putrified: and in many places, where no such thing was before, many shel-fishes have bred, when once the place waxed muddy, for lack of moisture. And that these fishes emit no seed or generative matter, it appears, because that when the men of Chios had brought out of Lesbos many Oysters, and cast them into Lakes neer the Sea, there were found no more then were cast in; onely they were somewhat greater. So then Oysters are generated in the Sea, in Rivers and in Lakes, and therefore are called Limnostrea, because they breed in muddy places. *Oppianus* writes also, that they have neither male nor female, but are generated of themselves and their own accord, without the help of any copulation. So the fish called *Ortica*, and the Purple, and Muscles, and Scallops, and Perwinkles, and Limpins, and all Shel-fish are generated of mud: for they cannot couple together, but live only as plants live. And look how the mud differs, so doth it bring forth different kinds of fishes: durty mud genders Oysters, sandy mud Perwinkles, the mud in the Rocks breedeth Holoturia, Lepades, and such-like. Limpins, as experience hath shewed, have bred of rotten hedges made to fish by; and as soon as the hedges were gone, there have been found no more Limpins.

Chap. V.

That new kinds of living Creatures may be generated of divers beasts, by carnal copulation.

WE have shewed that living Creatures are generated of putrefaction: now we will shew, that sundry kinds of beasts coupling together, may bring forth new kinds of Creatures, and these also may bring forth others; so that infinite monsters may be daily gendred: for whereas *Aristotle* saith, that Africk alwayes brings forth some new thing; the reason thereof is this, because the Country being in most places dry, divers kinds of beasts come out of sundry quarters thither, where the Rivers were, and there partly for lust, and partly by constraint, coupled together, and so gendred divers monstrous Creatures. The Antients have set down many such generations, and some are lately devised, or found out by chance; and what may be hereafter, let men of learning judge. Neither let the opinions of some Philosophers stay us, which hold that of two kinds divers in nature, a third cannot be made, unlike to either of the parents; and that some Creatures do not gender at all, as Mules do not: for we see, that, contrary to the first of these their positions, many Creatures are generated of kinds divers in nature, and of these are generated others, to the perpetual conservation of this new kind; as hath been tried in many Villages, that divers kinds coupling together, have brought forth other new kinds, differing from their progenitors every day more and more, as they multiply their copulations, till at length they are scarce in any thing like the former. And against their second Position, we must not think that the one example of Mules not gendring, should prejudice the common course of other creatures. The commistions or copulations, have divers uses in Physick, and in Domestical affairs, and in hunting: for hereby many properties are conveyed into many Creatures. First, we will rehearse those experiments, which the Antients have described, and then those which new Writers have recorded, and our selves have seen in divers Countries. And by this, the ingenious Reader may find out others. But first I will relate certain observations, which *Aristotle* and others have prescribed, that this kind of generation may be more easily

wrought. First, the creatures thus coupled, must be of an equal pitch; for if there be great oddes in their bignesse, they cannot couple: a dog and a wolf, a Lion and a Panther, an Asse and a Horse, a Partridge and a Hen, are of one bignesse, and therefore may couple together; but a Horse and a Dog, or a Mare and an Elephant, or a Hen and a Sparrow cannot. Secondly, they must have one and the same space to bring forth in: for if one of them bring forth in twelve moneths, and the other in six, then the young will be ripe by one side, when it is but half ripe by the other. A dog must have two moneths, and a horse must have twelve: and the Philosopher saith, no creature can be born, except he have his full time. So then a dog cannot be born of a man, nor a Horse of an Elephant, because they differ in the time of their bearing. Again, the creatures which we would thus couple, must be one as lustful as the other: for a chaste creature, that useth coition but once a year, if he have not his female at that time, he loseth his appetite before he can fancy any other mate: but those which are full of lust, will eagerly couple with another kind as well as their own. Among four-footed beasts, a dog, a goat, a swine, an ass, be most lascivious; among birds, partridges, quailes, doves, sparrows. Moreover, they must be coupled at such a time as is fit for generation: for Nature hath prescribed certain times and ages fit for that work. The common time, is the Spring; for then almost all Creatures are prone to lust. The ages of them must likewise be fit: for the generative power comes to creatures, at a set age. Neither of them must be barren, nor weak, nor too young; for then their seed is unfit for generation: but both of them, if it may be, in the prime of their best age and strength. If any creatures want appetite thereunto, there be many slights, whereby we may

Make them eager in lust.

And if the female do cast out the seed, there be means to make her hold in it. Provokements to lust there are many set down by Writers, and some usual with us. *Ælianus* writes, that keepers of sheep, and goats, and Mares, do besmear their hands with salt and nitre, and then rub the generative parts of them in the time of their coition, for their more lustful and eager performance of that action. Others besmear them with pepper, others with nettles seed, others with myrrh and nitre; all of them kindle the appetite of the female, being well rubbed therewith, and make her stand to her male. The He-goats, if you besmear their chin, and their nostrels with sweet ointment, are thereby much enclined to lust; and contrariwise, if you tie a thred about the middle of their tail, they are nothing so eager of copulation. *Absyrtus* sheweth, that if you wipe off some nature or seed of a mare, and therewith besmear the nostrils of a Stallion horse, it will make him very lustful. *Dydimus* saith, that if Rams, or any other beasts, feed upon the herb Milk-wort, they will become both eager to lust, and stronger for the act of copulation. *Pliny* sheweth, that Onions encrease desire of copulation in beasts, as the herb Rotchet doth in men. The She-ass, holds the seed within her the better, if presently after copulation she be well beaten, and her genitories besprinkled with cold water, to make her run after it. Many such helps are recorded by those who have written the histories of living creatures.

CHAP. VI.

How there may be Dogs of great courage, and divers rare properties, generated of divers kinds of Beasts.

WE will first speak of Dogs, as being a most familiar creature with us, and suiting with many beasts, in bignesse, in like time of breeding; and besides, being alwayes ready for copulation, and very lecherous, oft-times coupling with beasts of a far divers kind, and so changeth his shape and fashion, leaveth the bad qualities of his own kind, and is made fitter to hunt, to keep any thing from spoil, to play or make sport, and for divers other uses. And first, how

A strong Indian-dog may be generated of a Tygre.

This is called by some, a Mastive; by others a Warrior, or a Hircan-Dog. *Aristotle* calls them Indian-dogs, and saith, they are generated of a Dog and a Tygre; and elsewhere, of a dog and another wilde beast, but he names it not. *Pliny* writes, that the Indians intending to generate dogs of Tygres, tie the She-tygres in the woods about rutting time; and dogs coupling with them engender young: but the first and second births they care not for, as being too fierce; but the third they bring up, as being milder and fitter for their uses. *Ælianus* relates the story of this kind of Dogs, out of Indian Writers: that the stoutest Bitches, and such as are swiftest to rũn, and best to hunt, are by the shepherds tied to certain Trees within the Tygres walk: as soon as the Tygres light upon them, if they have not before met with their prey, they devour them; but if they be full of meat, and hot in lust, then they couple with the Bitches; and so generate, not a Tygre, but a dog, their seed degenerating into the mothers kind. And these dogs thus gendred, scorn to hunt a Boar, or an Hart; but a Lion they will set gallantly upon. A Noble man of India made trial of the valor of these dogs, before *Alexander* the Great, on this manner: first, he set an Hart before him; but the Dog scorning the Hart, stirred not at him; next, a Boar, but neither stirred he at the Boar; after that a Bear, but he scorned the Bear too: last of all, a Lion; then the Dog seeing that he had an even match in hand, rose up very furiously, and run upon the Lion, and took him by the throat, and stifled him. Then the Indian that shewed this sport, and knew well this Dogs valour, first cut off his tail; but the Dog cared not for his tail, in comparison of the Lion which he had in his mouth: next, he cut off one of his legs; but the Dog held fast his hold still, as if it had been none of his legs: after that, he caused another of his legs to be broken; but the Dog still kept his hold: after that, his third leg, and yet still he kept his hold: after that, his fourth leg, and yet the Dog was still as fierce upon the Lion, as at the first: Nay, when last of all his head was cut off from his body, yet still it stuck fast by the teeth in the same place, where he took his first hold. *Alexander* seeing this, was much grieved for the Dogs death, and greatly amazed at his valour, that he would rather suffer his life, then his courage to be taken from him. The Indian perceiving that, gave to *Alexander* four such Dogs; and he received them as a great Present, and accepted them gladly and thankfully: and moreover, rewarded the Indian that gave them, with a Princely recompence. This same story *Philes* also writes. But *Diodorus Siculus* and *Strabo*, say that *Sopithes* a King, gave *Alexander* an hundred and fifty of these Dogs, all very huge and strong, and usually coupling with Tygres. And *Pollux* writes the same. And *Plutark* describes the Indian-dog, and his fight before *Alexander*, as it is before related: *Pliny* writes, that the King of Albania gave *Alexander* a great Dog, wherewith he was much delighted: but when he brought the Dog, first Bears, then Boars, and then Deer, and saw he would not touch them, being much offended that so great a body should have so little courage, he caused him to be killed. The King that gave him, hearing this, sent him another, and withal charged the Messenger, that he should not be tryed in small matches, but either with a Lion or an Elephant. So then, *Alexander* caused a Lion to be set before him, and presently the Dog killed him: afterward he tried him with an Elephant; and the Dog bristled and barked at him, and assaulted him so artificially every way, till the Elephant was giddy with turning about, and so fell down and was killed. *Gratius* writes of this kind of dogs, thus generated of a Bitch and a Tygre. There is also another kind of Dogs.

Generated of a Lion.

And these are strong Dogs, and good Hunters. *Pollux* saith, that Arcadian Dogs first came of a Dog and a Lion, and are called Lion-dogs. And *Cœlius* writes the same: and *Oppianus* commends the Arcadian Dogs, and those of Tegea, which is a Town of Acadia. This is also

A strong and swift Dog, gendred of a kind of Wolf called Thos,

which, as *Aristotle* writes, is in all his entrails like a Wolfs; and is a strong beast, swift, and is wont to encounter the Lion. *Pliny* saith, it is a kind of Wolf; *Hesychius* saith, it is like a Wolf; *Herodotus*, that it is gendred in Africa: *Solinus* calls them Ethiopian Wolves: *Nearchus* calls these beasts Tygres, and saith there be divers kinds of them. Wherefore *Gratius* saith, that dogs generated of these Thoes, are strong, and fit to hunt; and calls them half-savage, as coming of a tame Dog, and a savage kind of Wolf. There is also a

Dog called Crocuta, gendred of a Dog and a Wolf.

Pliny saith, that these Dogs break all things with their teeth, and presently devour them. As the Indians join Tygres, so do the Gaules join Wolves and Dogs together; every herd of Wolves there, hath a Dog for their Ring-leader. In the Country of Cyrene in Libya, Wolves do couple with Dogs, as *Aristotle* and *Pollux* write. *Galen* in his book concerning the use of Parts, writes, that a Bitch may conceive by a He-wolf, and so the She-wolf by a Dog, and retain each others seed, and ripen it to the bringing forth of both kinds. *Diodorus* saith, that the dog which the Æthiopian calls Crocuta, is a compound of the Nature of a Dog and a Wolf. When *Niphus* was hunting, one of his dogs eagerly pursued a she-wolf, and overtaking her, began to line her, changing his fiercenesse into lust. *Albertus* saith, that the great Dog called a Mastive, is gendred of a Dog and a Wolf. I my self saw at Rome, a dog generated of a wolf; and at Naples, a she-wolf of a dog. *Ovid* saith, that the dog Nape was conceived of a Wolf; and *Ovid* and *Virgil* both, mention the dog Lycisca, which, as *Isidore* writes, are generated of wolves and dogs coupling together. *Cœlius* calls these dogs Chaonides; being gendred of a kind of wolf called Chaos, as some suppose, whence they have that name. But if we would generate swift dogs, as Grey-hounds, we must join dogs with some swift beasts. As, couple dogs and foxes together, and they will

Gender swift Dogs, called Lacedæmonian Dogs.

Aristotle, and out of him *Galen*, report, that beasts may couple together, though they be of a divers kind; so that their nature do not much differ, and they be of a like bignesse, and thereby sutable for their times of breeding and bringing forth, as it is betwixt dogs and wolves; of both which, are gendred swift dogs, called Lacedæmonian dogs: the first births are of both kinds; but in time, after sundry interchangeable generations, they take after the dam, and follow the kind of the female. *Pollux* saith, These are called Alopecidæ, fox-dogs; as *Xenophon* also writes of them, and makes them to be hunting dogs: and surely the best and swiftest hunting dogs, as Grey-hounds, are long-headed, and sharp-snouted, as foxes are. *Hesychius* and *Varinus* call them Dog-foxes. But now, if we would generate a kind of

Swift Dogs, and strong withal,

we must make a medley of sundry kinds of dogs together; as a Mastive and a Grey-hound gender a swift, and withal a strong dog, as *Aristotle* writes: or else couple a dog with a wolf, or with a Lion; for both these mixtions have Hunts-men devised; the

former, to amend certain natural defects in one kind; and the latter, to make their dogs stronger for the game, and craftier to espie and take advantages; as commonly, together with the properties of the body, the qualities of the mind are derived into the young ones. *Ovid* mentions such mungrels amongst *Actæons* dogs: and *Oppianus* in his book of Hunting, counsels to join in the Spring-time, divers dogs together, if we desire to have any excellent parts in any; as the dogs of Elis, with them of Arcadia; the dogs of Crete, with them of Pannonia; Thracians, with them of Caria; Lacedæmonian with them of Tuscia; and Sarmatian dogs, with Spanish dogs. Thus we see, how to generate a dog as stomackful as a Lion, as fierce as a Tygre, as crafty as a fox, as spotted as a Leopard, and as ravenous as a Wolf.

Chap. VII.

How to generate pretty little dogs to play with.

Because a dog is such a familiar creature with man, therefore we will shew how to generate and bring up a little dog, and one that will be play-full. First of the generation

Of little Dogs.

In times past, women were wont to esteem little dogs in great price, especially such as came from Malta the Island situate in the Adriatical Sea, neer to Ragusius. *Callimachus* terms them Melitean dogs. And *Aristotle* in his Problems, shews the manner of their generation; where he questioneth, Why amongst living creatures of the same kind, some have greater, and some have smaller bodies; and gives thereof a double reason: one, is the straightnesse of the place wherein they are kept; the other, is the scarcenesse of their nourishment: and some have attempted to lessen the bodies of them, even after their birth; as they which nourish up little whelps in small cages: for thereby they shorten and lessen their bodies; but their parts are prettily well knit together, as appears in Melitæan dogs: for nature performes her work, notwithstanding the place. *Athenæus* writes, that the Sybarites were much delighted with Melitæan dogs, which are such in the kind of dogs, as Dwarfes are among men. They are much made of, and daintily kept, rather for pleasure then for any use. Those that are chosen for such a purpose, are of the smallest pitch, no bigger at their best growth then a mouse, in body well set, having a little head, a small snout, the nose turning upward, bended so for the purpose when they were young; long ears, short legs, narrow feet, tail somewhat long, a shagged neck, with long hair to the shoulders, the other parts being as it were shorn, in colour white; and some of them are shagged all over. These being shut up in a cage, you must feed very sparingly, that they never have their fill; and let them couple with the least you can find, that so lesse may be generated; for so *Hippocrates* writes, that Northern people, by handling the heads of dogs while they be young, make them lesse then, and so they remain even after they are come to their full growth: and in this shape they gender others, so that they make, as it were, another kind. But if you would know the generation of a

Dog that will do tricks and feats,

one that will make sport of himself, and leap up and down, and bark softly, and gnaw without biting, and stand upon his hindermost legs, holding forth his other legs like hands, and will fetch and carry; you must first let them converse and company with an Ape, of whom they will learn many sportful tricks; then let them line the Ape; and the young one which is born of them two, will be exceeding practised to do feats, such as Juglers and Players are wont to shew by their dogs. *Albertus* saith, that these kind of dogs may very well be generated of a dog and a fox.

CHAP.

CHAP. VIII.
How to amend the defects and lacks that are in dogs, by other means.

WE may alſo ſupply the lacks that are in dogs, by other means, and teach them new qualities, even by their food and nouriſhment: for we have ſhewed oft-times, that qualities are drawn in together with the milk and nouriſhment whereby we live. *Columella* ſhews how

to make Dogs ſtrong and ſwift:

If you would have them full of ſtout ſpirits, you muſt ſuffer them to ſuck the breaſts of ſome other beaſts; for alwayes the milk, and the ſpirits of the nurſe, are much available, both for the quality of the body, and the qualities of the ſoul. *Oppianus* bids us to keep hunting dogs from ſucking any ordinary Bitches, or Goats, or Sheep; for this, ſaith he, will make them too lazy and weak; but they muſt ſuck a tame Lioneſſe, or Hart, or Doe, or Wolf; for ſo they will become ſwift and ſtrong, like to their nurſes that give them ſuck. And *Ælianus* gives the very ſame precept, in the very ſame words: for, ſaith he, when they ſhall remember that they had ſuch ſtrong and ſwift nurſes, nature will make them aſhamed not to reſemble their qualities. *Pollux* ſaith, that for a while, the Dams milk is fitteſt meat for whelps; but after, let them lap the blood of thoſe beaſts which dogs have caught, that by little and little they may be acquainted with the ſweetneſſe of hunting. *Cteſias* in his book of Indian matters, writes, that the people called Cynamolgi, do nouriſh and feed many dogs with Bulls blood, which afterward being let looſe at the Bulls of India, overcome them and kill them, though they be never ſo fierce: and the people themſelves milk their Bitches, and drink it, as we drink Goats or Sheeps milk, as *Ælianus* reports: and *Solinus* writes, that this is ſuppoſed to make that people flap-mouthed, and to grin like dogs. We may alſo make

an Aſs become couragious,

if we take him as ſoon as he is brought forth into the world, and put him to a Mare in the dark, that ſhe may not diſcern him; for her own Colt being privily taken from her, ſhe will give ſuck to the Aſſe as to her own foale: and when ſhe hath done thus for the ſpace of ten daies, ſhe will give him ſuck alwayes after willingly, though ſhe know him to be none of hers. Thus ſhall he be larger, and better every way.

CHAP. IX.
How to bring forth divers kinds of Mules.

WE will ſpeak of the commixtion of Aſſes, Horſes, and ſuch like: though it be a known matter, yet it may be we ſhall adde ſomething which may delight the Reader. *Ælianus* writes out of *Democritus*, that Mules are not Natures work, but a kind of theft and adultery deviſed by man: firſt committed by an Aſſe of Media, that by force covered a Mare, and by chance got her with foal; which violence men learned of him, and after that made a cuſtom of it. *Homers* Scholiaſt ſaith, that Mules were firſt deviſed by the Venetians, a City of Paphlagonia. It is written in *Geneſis*, chap. 36. v. 24. that *Anah*, *Eſau's* kinſman, feeding his fathers Aſſes in the wilderneſſe, found out Mules. Now

A Mule cometh of a Mare and an Aſs:

They have no root in their own kind, but are graffed as it were, and double-kinded,

ded, as *Varro* saith. If you would have a strong and a big Mule, you must chuse a Mare of the largest assize, and well-knit joints, not regarding her swiftnesse, but her strength. But there is another kind of mule called Hinnus, that cometh

of a Horse and a She-ass.

But here special choice must be made of the Asse, that she be of the largest assize, strongly jointed, and able to endure any labour, and of good qualities also; for howsoever it is the Sire that gives the name to the young one, and it is called Hinnus, of the Horse; yet it grows altogether like the Dam, having the main and the tail of an Asse, but Horses ears; and it is not so great of body as the Mule is, but much slower, and much wilder. But the best She-mules of all, are generated

of a wilde Ass, and of a She-ass,

and these are the swiftest too; for though the Mule that is begotten by the He-asse, be both in shape and qualities very excellent in his kind, yet that which is begotten of the wilde Asse, cometh nothing behind the other, but only that it is unruly and stubborn, and somewhat scammel, like the Sire. These Mules thus gendred of a wilde Asse, and a She-asse, if they be males, and put to cover a Mare, beget excellent young ones, which by little and little wax tame, resembling the shape and mildnesse of their Sire, but the stomack and swiftnesse of their Grand-sire; and they have exceeding hard feet, as *Columella* writes. These happily are the Mules which *Aristotle* writes, are only in Syria, swift, and fertile, called by the common name of Mules, because of their shape, though their kind be of a wild Asse. But there is a more common kind of

Strong Mules gendred of a Bull and an Ass,

which is a fourth sort of Mules, found in Gratianopolis, and called by a French name, Jumar. *Gesner* reports, that at the foot of the Hill Spelungus in Rhetia, was seen a Horse gendred of a Mare and a Bull. And I my self saw at Ferraria, certain beasts in the shape of a Mule, but they had a Bulls head, and two great knobs in stead of horns; they had also a Bulls eyes, and were exceeding stomackful, and their colour was black: a spectacle, wherewith we were much delighted. I have heard, that in France, they be common; but I could see none there, though I passed through the whole Country.

Chap. X.

How to mingle the Sheep and Goats together, by generation.

If we would better any qualities in a Ram, we must effect it by coupling them with wild beasts, such as are not much unlike, either in quantity or in kind. There is a beast called

Musinus, gendred of a Goat and a Ram.

Pliny saith, that in Spain, but especially in Corsica, there are beasts called Musimones not much unlike to Sheep, which have Goats hair, but in other parts, Sheep: the young ones which are gendred of them, coupling with Sheep, are called by the Antients, Umbri: *Strabo* calls them Musimones. But *Albertus* calls them Musini or Musimones, which are gendred of a Goat and a Ram. I have heard that in Rhetia, in the Helvetian confines, there are generated certain beasts, which are Goats in the hinder parts, but in the former parts, Sheep or Rams; but they cannot live long, but commonly they die, as soon as they are born: and that there the Rams being grown in years, are very strong and lustful, and so oft-times meeting with goats,

do run over them: and that the young ones which wilde Rams beget of tame Sheep, are in colour like the Sire, and so is their breed after them; and the wool of the first breed is shaggy, but in their after-breed soft and tender. On the other side, there is a beast called

Cinirus, generated of a He-goat, and an Ewe,

as the same *Albertus* writeth. But the best devised adultery is, to couple in generation, and thereby to procreate young ones, of

A wilde and a tame Goat.

Writers affirm, that whatsoever kind hath some wilde, and some tame, the wildenesse of them, if they couple with the tame of the same kind, is altered in the succeeding generations; for they become tame. *Columella* writes, that many wilde Rams were brought out of Africa into Cales, by some that set out games before the people; and *Columella*, the Uncle of this Writer, bought some of them, and put them into his grounds; and when they were somewhat tame, he let them cover his Ewes: and these brought lambs that were rough, and had the colour of their Sire: but these then afterward coupling with the Ewes of Tarentum, begot lambs that had a thinner and a softer fleece. And afterward, all their succeeding generations resembled the colour of their Sires, and Grand-sires, but the gentlenesse and softnesse of their Dams. The like is experienced in Swine: for we may bring forth

Of a wild and a tame Swine, the beast called Hybrides:

for a Boar is exceeding hot in lust, and wonderfully desires coition; insomuch, that if the female refuse to couple with him, either he will force her, or kill her. And surely howsoever, some wilde beasts being made tame, are thereby unfit for generation, as a Goose, a Hart brought up by hand from his birth; and a Boar is hardly fruitfull in such a case: yet there is no kind so apt for generation, the one being wilde, and the other tame, as the kind of Swine is. And those which are thus gendred, these half-wilds, are called Hybrides, happily because they are generated in reproachful adultery: for *Hybris* signifies reproach.

CHAP. XI.

Of some other commixtions, whereby other beasts of divers kinds are generated.

We will speak yet farther of the commixtion of divers beasts differing in kinde; as also of other mixtions derived from these, so to find out all such kinds: and moreover we will shew, that of their young, some take after the Sire most, and some after the Dam. And first, that

A Leopard is gendred of a Libard and a Lioness.

The Lionesse is reported to burn in lust; and because the Lion is not so fit for copulation, by reason of his superfluity of heat, therefore she entertains the Libard into the Lions bed: but when her time of bringing forth draws neer, she gets away into the Mountains, and such places where the Libards haunt: for they bring forth spotted whelps, and therefore nurse them in thick woods very covertly, making shew to the Lions, that they go abroad only to seek some prey; for if the Lions at any time light upon the whelps, they tear them in pieces, as being a bastard brood, as *Philostratus* writes. In the wilde of Hircania, there are Leopards, as it were, another kind of Panthers, which are known well enough, which couple with the Lionesse, and beget Lions; but they are but base Lions, as *Solinus* writes. *Isiodore* saith, that

that the Libard and the Lionesse coupling together, procreate a Leopard, and so make a third kind. *Pliny* saith, That those Lions which are generated of Libards, do want the mones of Lions. And *Solinus* saith, that the Lion can find out by his smell, when the Lionesse hath played the Harlot; and seeks to revenge it upon her with all his might: and therefore the Lionesse washes her self in some River, or else keeps aloof from him, till the scent be wasted. Now as there are two sorts of Mules, one of a Horse and an Asse, the other of an Asse and a Mare; so there are two sorts of Leopards, one of a Libard and a Lionesse, the other of a Lion and a Panther, or She-libard: that is in body like a Lion, but not in courage; this is in body and colour like a Libard, but not in stomack: for all double-kinded creatures, take most after their mother, especially for shape and quantity of their bodies. *Claudianus* saith, that there is a kinde of Libard, which he calls a Water-libard, that is generated of a mingled seed, when a strong and vigorous Libard meeteth with a Lionesse, and happily coupleth with her: and this kinde of Libard is like the Sire for his spots, but his back and the portraiture of his body is like his Dam. Now there is another copulation of the Lionesse, when the

Hyæna and the Lionesse gender the beast Crocuta;

for the Lionesse is very furious in lust, (as we shewed before) and couples with divers kinds of beasts: For *Pliny* writes, and *Solinus* writes the same, That the Hyæna and the Lionesse of Æthiopia, gender the beast Crocuta. Likewise the Panther is a most lustful beast, and she also couples with beasts of divers kinds; with a Wolf especially: of both which, the

Hycopanther, or beast called Thoes, is gendred;

for the Panther, when her sacoting is come, goeth up and down, and makes a great noise, and thereby assembles many, both of her own kind, and of other kinds also. And amongst the rest, the Wolf oft-times meets and couples with her, and from them is generated the beast Thoes, which resembles the Dam in the spots of his skin, but in his looks he resembles the Sire. *Oppianus* saith, That the Panther and the Wolfe do gender this Thoes, and yet he is of neither kinde: for, saith he, oft-times the Wolfe cometh to the Panthers Den, and couples with her; and thence is generated the Thoes: whose skin is very hard, and is meddled with both their shapes; skinned like a Panther, and headed like a Wolfe. There is also a

Thoes gendred of a Wolf and a female Hyæna.

This medley, *Hesychius* and *Varinus* have described; That of them comes this Thoes, as the Greeks call it. The Scholiast upon *Homer* saith, That it is like to the Hyæna: and some call it Chaos. *Pliny* saith, That this Chaos, which by the French is called Raphium, was first set forth for a shew, in the games of *Pompey* the Great: and that it hath spots like a Leopard, but is fashioned like a Wolf. But the Greeks make mention of a very strange adultery, that

The Bactrian Camel is gendred of a Camel and a Swine;

for *Didymus*, in his workes called Geoponica, reporteth, that in certain Mountaines of India, Boares and Camels feed together, and so fall to copulation, and gender a Camel: and this Camel so gendred, hath a double rising, or two bunches upon his back. But as the Mule which is generated of a Horse and an Ass, is in many qualities like the Sire, so the Camel which

is begotten of a Boar, is strong and full of stiffe bristles like a Boar; and is not so soon down in the mud as other Camels are, but helps himself out lustily by his own force; and will carry twice so great a burthen as others. But the reason of their name, why they are called Bactrian Camels, is this; Because the first that ever was so generated, was bred in the Country of Bactria.

CHAP. XII.

Of sundry copulations, whereby a man genders with sundry kinds of Beasts.

I Am much ashamed to speak of it, that Man being the chief of all living Creatures, should so foully disparage himself, as to couple with bruit beasts, and procreate so many half-savage Monsters as are often seen: wherein Man shews himself to be worse then a beast. I will relate some few examples hereof, thereby to make such wicked wretches an obloquie to the World, and their names odious to others. *Plutark* saith, That bruit beasts fall not in love with any, but of their own kinde; but man is so incensed with lust, that he is not ashamed most villanously to couple himself with Mares and Goats, and other Beasts; for Man is of all other Creatures most lecherous, at all seasons fit and ready for copulation; and besides, agrees with many living Creatures in his time of breeding: all which circumstances make much for the producing of monstrous, and half-savage broods. And howsoever the matter we speak of is abominable, yet it is not fruitlesse, but helps much to the knowledge of some other things in the searching out of the secrecies of nature. *Plutark* in his Tract, which he calls the Banquet of the wise men, sheweth, that a shepherd brought into the house of *Periander*,

A Babe gendred of a Man and a Mare,

which had the hands, and neck, and head of a Man, but otherwise it was like a Horse; and it cried like a young child. *Thales*, as soon as he saw it, told *Periander*, that he did not esteem it as a strange and monstrous thing, which the gods had sent to portend and betoken the seditions and commotions likely to ensue, as *Diocles* thought of it; but rather as a naturall thing: and therefore his advice was, that either they should have no Horse-keepers; or if they had, they should have wives of their own. The same Author in his Parallels, reporteth out of *Agesilaus* his third book of Italian matters, that *Fulvius Stella* loathing the company of a woman, coupled himself with a Mare, of whom he begat a very beautiful maiden-child; and she was called by a fit name, *Epona*. And the same *Plutark* reporteth also of

A maiden that was generated of a Man and an Ass;

for *Aristonymus Ephesius*, the Son of *Demonstratus*, could not away with a womans company, but made choice of an Asse to lie with; and she brought him forth after a certain time, a very comely maiden, and in shew exceeding beautiful: she was called *Onoscelis*, that is to say, one having Asses thighes: and this story he gathered out of *Aristotle*, in the second of his Paradoxes. But *Galen* cannot think this possible; nay, it is scarce possible in nature, seeing a Man and an Asse differ so much as they do: for if a man should have to do with an Asse, her wombe cannot receive his seed, because his genitories are not long enough to convey it into her place of conception: or if it were, yet she would presently, or at least not long after,

after, marre his seed. Or, if she could so conceive, and bring her birth to perfection, how, or by what food should it be nourished after the birth? But, though this can hardly be, yet I do not think it altogether impossible, seeing all men are not of a like complexion, but some may be found, whose complexion doth not much differ from a horses; and some men also have longer and larger genitories then others; as also some Mares and Asses have lesse and shorter genitories then others have: and it may be too, that some celestial influence hath a stroke in it, by enliving the seed, and causing the Dam to conceive it, and bring it forth in due time. And because all these things do very seldom concur together, therefore such births are very seldom seen. *Ælianus* writeth another story, That there was once generated

A half-beast of a Man and a Goat.

There was a certain young man in Sybaris, who was called *Crachis*, a luster after Goats; and being over-ruled by his lust, coupled himself with a fair Goat, the fairest he could light upon, and lived with her as his Love and Concubine, bestowing many gifts upon her, as Ivy and Rushes to eat; and kept her mouth very sweet, that he might kisse her; and laid under her soft grasse, that she might lie easie, and sleep the better. The He-goat, the Ring-leader of the Herd, espying this, watcht his time when the young man was on sleep, and fell upon him and spoiled him. But the She-goat, when her time was come, brought forth an infant that had the face of a man, but the thighs of a Goat. The same Author writes, That

Women lie with He-goats, and with the Cynocephali;

for the He-goats are so lecherous, that in the madnesse of their lust, they will set upon Virgins, and by force ravish them. *Herodotus* in his second book, writeth of a He-goat, that had to do with a woman openly, and in the sight of many men standing by. *Strabo* saith, that in the Mediterranean Sea, a little without the mouth of a River neer to Sebenis and Pharnix, there is an Island called Xoas, and a City within the Province of Sebenis, and the Cities Hermopolis and Mendes, where Pan is honoured for a God, and with him is likewise honoured a He-goat; and there, as *Pindarus* reports, He-goats have to do with women: In the utmost corner of the winding of the River *Nilus*, saith he, are fed certain Herds of Goats; and there the lecherous He-goats are mingled with women. *Ælianus* also writes of the Indians, that they will not admit into their Cities any red Apes, because they are oft-times mad in lust towards women; and if at any time they find such Apes, they hunt and destroy them, as being adulterous beasts. *Pliny* writes also, That

Man couples with divers kinds of beasts:

for some of the Indians have usual company with bruit beasts; and that which is so generated, is half a beast, and half a man.

Chap. XIII.

That divers kinds of birds may be generated of divers birds coupling together.

Before we come to speak of the commixtion of birds, it is meet to prescribe certain observations for the more easie effecting thereof; that if we have need to supply any defects in any birds, we may be the better instructed

instructed how to perform it readily, to make them fitter for our uses. We shewed before out of *Aristotle*, that if we would mingle Creatures of divers kinds, we must see that they be of like bignesse, of a like proportion of time for their breeding, of a like colour; but especially, that they be very lecherous; for otherwise they will hardly insert themselves into a strange stock. If a Falconer be desirous to produce fighting Hawks, or Cocks, or other birds, he must first seek out good lusty males, such as be strong and stomackful, that they may derive the same qualities into their young ones. Next, they must procure strong and couragious females: for if but one of them be stomackful, the young ones will rather take after the dulnesse and faint-heart of the one, then after the quicknesse and courage of the other. When you have thus made choice of the best breeders, before their copulation, you must keep them together within doors, and bring them by little and little acquainted with each other; which you may best do, by causing them to feed and to live together. Therefore you must prepare a pretty little cottage, about ten foot long, and ten foot broad; and let all the windows be made out toward the South, so that there may good store of light come in at the top of the house. In the middle you must make a partition with lattises or grates, made of Osiers: and let the rods stand so far asunder, as that the birds head and neck may go in between them: and in one side of the room, let that bird be alone by her self, which you would make tame; in the other side, put the other birds which you purpose to join in copulation with the strange bird. So then, in the prime of the Spring, (for that is the time wherein all Creatures are most eager in lust) you must get you fruitful birds, and let them be of the same colour, as is the bird which you desire to become tame. These you must keep certain daies at the same boord as it were, and give them their meat together, so that the strange bird may come at it through the grate: for by this means she will learn to be acquainted with them, as with her fellows, and will live quietly by them, being as it were kept in prison from doing them any wrong: whereas otherwise she would be so fierce upon them, that she would spare none, but if she could, destroy them all. But when once by tract of time, and continual acquaintance with his fellows, this male-bird is become somewhat gentle, look which of the females he is most familiar with, let her be put in the same room where he is; and give them both meat enough. And because commonly he either kills, or doth not care for the first female that is put unto him, therefore, lest the keeper should lose all his hope, he must keep divers females for supply. When you perceive that he hath gotten the female with young, presently you must divorce one of them from the other, and let him in a new mate, that he may fill her also: and you must feed her well till she begin to sit upon her egges, or put the egges under some other that sits. And thus shall you have a young one, in all respects like the Cock: but as soon as the young ones are out of the shell, let them be brought up by themselves, not of their mother, but of some other Hen-bird. Last of all, the females of this brood, when they be come to ripenesse, that they stand to their Cock, their first or their second brood will be a very exact and absolute kinde.

CHAP. XIV.

Divers commixtions of Hens with other Birds.

WE will begin with Hens, because they are in great request with us, and are houshold-birds, alwayes before our eyes; and besides, they may be very profitable and gainful, if we can tell how to procreate and bring up divers kinds of them. Cocks are of all other most lecherous; and they spend their seed, not only at the sight of their Hens, but even when they hear them crake or cackle; and to represse their lust, they are oftentimes carved. They tread and fall to their sport, almost all the year long. Some Hens are very lusty, and withal very fruitful; insomuch that they lay three-score egges before they sit to hatch them: yea, some that are kept in a pen, do lay twice in one day; and some bring forth such store of

of egges, that they consume themselves thereby, and die upon it. We will first shew

How to couple a Partridge with a Hen.

Partridges are much given to lust, and very eager of coition, and are mingled with other birds of divers kinds, and they couple betwixt themselves, and so have young ones; as first with Hens, of whom they procreate certain birds, which partake of both kinds in common, for the first brood; but in processe of time, when divers generations have successively passed, they take meerly after the mother in all respects, as *Aristotle* writeth. The field-cocks are usually more lustful then houshold-cocks are, and they tread their Hens as soon as ever they are off the roust; but the Hens are more inclinable to coition, about the middle of the day, as *Athenæus* writes, out of *Ælianus* and *Theophrastus*: of which circumstances we may take our best advantage in coupling them with Partridges. After the same manner

A Hen and a Pheasant may gender together;

for, as *Florentius* writes, the Pheasant and the Hen agree both in their time of laying, either of them bringing forth egges one and twenty daies after conception. And though she be not so wanton as other birds are, yet in their treading time they are glad of coition, and not very wilde, especially those that are of the smaller sort: for these may easily be made tame, and suffered to go amongst Hens; but at their first taking they are very fierce, insomuch that they will not only kill Hens, but even Peacocks too. Some men bring up Pheasants to make a game of them: but some breed them for delight and pleasure, as I saw at Ferraria in the Princes Court, where was brought up very great store, both of Hens and Pheasants too. And this hath been an old practice: for in *Athenæus* we find a saying of *Ptolomy*, that not only Pheasants were sent for out of Media, but the Country Hens, they also afforded good store of them, the egges being conceived in them by the treading of a Cock-pheasant. First then, you must take a Cock-pheasant, and be very careful in keeping of him tame amongst your Hens: after that, you must seek out Country-hens of divers colours, as like the colour of the Hen-Pheasant as you can, and let them live with the Cock-Pheasant, that in the Spring-time he may tread the Hens; and they will bring forth speckled egges, everywhere full of black spots, far greater and goodlier then other egges are. When these are hatched, you must bring up the chicken with barly-flour, and some leaves of smallage shred in amongst it; for this is the most delightful and nourishing food that they that they can have. There is also

A Chick gendred of a Pigeon and a Hen:

the Pigeon must be young, for then he hath more heat and desire of copulation, and much abundance of seed; for if he be old, he cannot tread: but young Pigeons do couple at all times, and they bring forth both Summer and Winter. I had my self at home a single Pigeon, & a Hen that had lost her Cock: the Pigeon was of a large size, and wanton withal; the Hen was but a very small one: these lived together, and in the Spring-time the Pigeon trode the Hen, whereby she conceived, and in her due season laid egges, and afterward hatched them, and brought forth chicken that were mixt of either kind, and resembled the shape of them both. In greatnesse of body, in fashion of head and bill, they were like a Pigeon; their feathers very white and curled, their feet like a Hens feet, but they were overgrown with feathers; and they made a noise like a Pigeon: and I took great pleasure in them; the rather, because they were so familiar, that they would still sit upon the bed, or nuzzle into some womans bosom. But there is yet another mixture, when

A Cock, and a Pea, gender the Gallo-Pavus;

which is otherwise called the Indian-hen, being mixt of a Cock and a Pea, though the shape be liker to a Pea then to a Cock. In body and greatnesse it resembles the Pea, but it hath a combe and chackels under the chin like a Cock: it hath the voice of a Pea, and spreads forth her tail, and hath such varietie of colours as she hath. The taste of her flesh relishes like a compound of them both; whereby it appears, that both kinds are not unfitly matcht together. But afterward, when the she Gallo-pavus and the Pea-cock were brought up tame together, we had of them very fruitful egges, which being hatcht, yeelded very goodly chickens, whose feathers were of a most orient and glistering colour: and these young ones afterward growing bigger, were mingled in copulation with Pea-cocks and Pea-hens, and the brood which was so generated of them, were in a manner all of the kind and fashion of the Pea. The like a man may conjecture of other kinds of birds.

CHAP. XV.

How to generate Hawkes of divers properties.

WE will shew some commixtions of Hawks, by the example whereof, you may imagine of your self the like in other birds: and hereby it shall appear how we may amend divers faults and defects in Hawks, and engraffe in them some new qualities to be derived from their sundry progenitors. And first, how

The bird Theocronus is gendred of a Hawk and an Eagle.

Hawks are exceeding hot in lust; and though there be divers kinds of them, yet they all couple together among themselves without any difference, as *Aristotle* writeth: they couple with Eagles, and thereby engender bastard Eagles. Eagles are most lecherous: and whereas among other creatures, the famale is not alwayes ready and willing to yeeld to the male for coition; yet the Eagles never refuse it: for though they have been trod never so oft, yet still, if the male desire copulation, the female presently yeelds unto him. *Ælianus* accounts ordinary and common Hawks in the kind of Eagles. *Oppianus* in his Ixeutica saith, that there is a bird known well enough, called Theocronus, which is generated of a male Hawk, and a female Eagle. There is a kind of Hawks so wholly given over to lust, that in the Spring-time they lose all their strength, and every little bird snaps at them; but in the Summer, having recovered her strength, she is so lusty, that she flies up and down to revenge her self upon those little birds; and as many of them as she catches, she devours. If the male of this kind do but hear the voice of the female Eagle, presently he flies to her, and they couple together: but the egges which she conceives by this base copulation, she scorns to hatch and sit upon: and that she may not be known of it to the male Eagle, she flies far away from him: for the male Eagle, if once he perceive that she hath played the harlot, divorces her from him, and is throughly revenged upon her. These birds are now commonly called Sea-eagles. There is also a commixtion, whereby the Hawk mingles himself

with a Faulcon, and with a Buzzard, and the Eagle Nisus;

for Hawks do not only couple with their own kind, but with Faulcons, Buzzards, and Eagles of divers kinds, as also with most of those fowles that live upon the prey and spoil of other birds; and according to the diversity of those kinds, divers kinds of Hawks are generated. Besides, they couple with strange Faulcons of other Countries, and other kinds: for as soon as they be hatcht and Pen-feathered, if their parents see that they are not right Faulcons, presently they beat them away; and so partly because they cannot endure their parents rage, and partly to get

get their living, they flie away into strange places; and there finding no mates of their own kind, they seek out a mate of another kind, the likest to her own kind that she can meet with, and couples with them. So then, if you have Hawks that descend from the right and best kind, art may more easily work upon them, then upon such as come of the baser sort. In like manner there may be generated of divers kinds of Eagles divers fowles, as

The Osprey, the fowl called Ossifragus, and Ravens also.

Pliny discoursing of the Osprey, saith, That they have no proper kinde of their own, but are descended from divers sorts of Eagles mingled together: and that which cometh of the Osprey, is of the kind of Ossifragi; and that which cometh of the Ossifragi, is a kind of little Ravens, and of these afterward is generated a kind of great Ravens, which have no issue at all: the Author of which assertions before *Pliny*, was *Aristotle* in his book of Wonders. *Oppianus* saith, that Land-eagles are a bastard brood, which their parents beat out of their nests, and so they are for a while nourished by some other fowles, till at length they forsake the Land, and seek their living in the Sea.

Chap. XVI.

Of the commixtion of divers kinds of fishes.

It is a very hard thing for a man to know, whether divers kinds of fishes be mingled together or no; because they live altogether under the waters, so that we cannot observe their doings; especially such as they practise against the ordinary course of nature. But if we rightly consider that which hath been spoken before, we may easily effect their commixtion, namely, if we take such fishes as are much given to venery, and match those together which are alike in bigness, in time of breeding, and in other such conditions as were before required. *Aristotle* in his book of living Creatures, saith, that divers fishes in kind never mingle their seeds together: neither did ever any man see two fishes of divers kinds couple in generation, excepting only these two,

The Skate and the Ray, which engender the Rhinobatos;

which is so called of both his parents names compounded together. And out of *Aristotle*, *Pliny* reporteth, that no fishes of divers kinds mingle their seeds, save only the Skate and the Ray; of both which is gendred the fish Rhinobatos, which is like the Ray in all his former parts, and hath his name in Greek answerable to his nature; for it is compounded of the names of both his parents. And of this kind of fish I never read nor heard any thing besides this. *Theodorus Gaza* translates the word Rhinobatos into *Squatino-raia* in Latine, that is, a Skate-ray: and though some deny that there is any such fish, yet surely it is found in the Sea about Naples; and *Simon Portus*, a very learned Philosopher of Naples, did help me to the sight of one of them; and the picture thereof is yet reserved, and it is to be seen.

Chap. XVII.

How we may produce new and strange Monsters.

Strange and wonderful monsters, and abortements, or untimely births, may be gendred of living Creatures, as by those wayes of which we spake before, namely, the commixtion of divers kinds; so also by other means, as by the mixture of divers seeds in one wombe, by imagination, or such like causes. Concerning Imagination, we will speak hereafter. Now at this time let us see the wayes of engendring such monsters, which the Ancients have set down, that the ingenious Reader

der may learn by the consideration of these wayes, to invent of himself other wayes how to generate wonderful monsters. *Democritus*, as *Aristotle* saith, held that the mixture of many seeds, when one is received into the wombe before, and another not long after, so that they are meddled and confounded together, is the cause of the generation of many Monsters, that sometimes they have two heads, and more parts then the nature of their kinde requires. Hence it is that those birds which use often coitions, do oftentimes bring forth such births. But *Empedocles*, having forecast all scruples and doubts within himself, seems to have attained the truth in this case: for he saith, that the causes of the generation of monstrous Creatures, are these; either if the seed be too much, or if it be too little, or if it light not in the right place, or if it be scattered into many parts, or if the congredients be not rightly affected to procreate according to the ordinary course of nature. And *Straton* assignes many reasons, why such monsters are generated; as, because some new seed is cast upon the former, or some of the former seed is diminished, or some parts transposed, or the wombe puffed up with winde. And some Physitians ascribe it principally to the place of conception, which is oft-times misplaced, by reason of inflations. *Aristotle* saith, that such Creatures as are wont to bring forth many young ones at one burthen, especially such as have many cells or receipts for seed in their wombe, do most commonly produce monsters: for in that they bring forth some that are not so fully perfect, thereby they degenerate more easily into monsters: especially of all other, the Pigs that are not farrowed at their due time, but some certain dayes after the rest of the litter; for these cannot chuse but be monsters in one part or other; because whatsoever is either more or less then that which the kind requires, is monstrous, and besides Nature. And in his book of Problems he saith, that small four-footed Creatures bring forth monsters: but Man, and the greater sorts of four-footed beasts, as Horses and Asses, do not produce them so often. His reason is, because the smaller kinds, as Bitches, Sows, Goats, and Ewes, are far more fruitful then the greater kinds are; for, of those, every one brings forth at least one, and some bring forth for the most part, many at once. Now Monsters are wont to be produced then, when there is a commixtion or confusion of many seeds together, either by reason of sundry copulations, or because of some indisposition in the place of conception. Hence it is, that birds also may bring forth monsters; for they lay egges sometimes that have a double yelk: and if there be no small skin that keeps both the yelks asunder, then the confusion of them causeth the breed to become monstrous. Nature is earnest in the fashioning of a living Creature; and first shapes out the principal parts of the body: afterwards she worketh sometimes more, sometimes lesse, as the matter can afford which she works upon, still framing her self thereunto: whereby it cometh to passe, that if the matter be defective, then she cannot have her forth; if it be overmuch, then is nature overcome, and so both wayes hindered of her purpose, and thereby brings forth monstrous broods, as in artificial births hath been often seen; some being defective, as having but one leg, or but one eye; some exceeding the ordinary course, as having four eyes, or four arms, or four feet, and sometimes having both sexes in them, which are called Hermaphrodites: and so, look how your art disposes and layes things together, and after the same manner, Nature must needs accomplish her work, and finish your beginnings. But whosoever wouldst bring forth any monsters by art, thou must learn by examples, and by such principles be directed, as here thou mayest find. First, thou must consider with thy self, what things are likely and possible to be brought to passe: for if you attempt likely matters, Nature will assist you, and make good your endeavours, and the work will much delight you: for you shall see such things effected, as you would not think of; whereby also you may find the means to procure more admirable effects. There be many reasons and wayes, whereby may be generated

Monsters in Man.

First, this may come by reason of inordinate or unkindly copulations, when the seed

seed is not conveyed into the due and right places: again, it may come by the narrownesse of the wombe, when there are two young ones in it, and for want of room, are pressed and grow together: again, it may come by the marring of those thin skinnes of partition, which nature hath framed in a womans wombe, to distinguish and keep asunder the young ones. *Pliny* writes, that in the year of *Caius Lælius* and *Lucius Domitius* Consulship, there was born a maid-child that had two heads, four hands, and was of double nature in all respects: and a little before that, a woman-servant brought forth a child, that had four feet, and four hands, and four eyes, and as many ears, and double natured every way. *Philostratus* in the life of *Apollonius* writes, that there was born in Sicily, a boy having two heads. I my self saw at Naples, a boy alive, out of whose breast came forth another boy, having all his parts, but that his head only stuck behind in the other boyes breast; and thus they had sticken together in their mothers wombe, and their navils also did cling each to other. I have also seen divers children having four hands and four feet, with six fingers upon one hand, and six toes upon one foot, and monstrous divers other wayes, which here were too long to rehearse. By the like causes may

Monsters be generated in Beasts.

We shewed before, that such beasts as bring forth many young ones at one burthen, especially such as have many cells or receits in their wombe for seed, do oftenest produce Monsters. *Nicocreon* the Tyrant of Cyprus, had a Hart with four horns. *Ælianus* saw an Oxe that had five feet; one of them in his shoulder, so absolutely made, and so conveniently placed, as it was a great help to him in his going. *Livy* saith, that at Sessa-Arunca a City in Italy, there was eaned a Lambe that had two heads; and at Apolis, another Lambe having five feet; and there was a kitling with but three feet. *Rhases* reports, that he saw a Dog having three heads. And there be many other like matters which I have no pleasure to speak of. But it may seem that

Monsters in Birds may be more easily produced;

both in respect that they are more given to lust, and because also they bear in their bodies many egges at once, whereby they may stick together, and easily cleave each to other: and besides this, those birds that are by nature very fruitfull, are wont to lay egges that have two yelkes. For these causes, *Columella* and *Leontinus* the Greek, give counsel to air and purge the houses where Hennes are, and their nests, yea and the very Hennes themselves, with Brimstone, and pitch, and torches; and many do lay a plate of iron, or some nailes heads, and some Bay-Tree boughs upon their nests; for all these are supposed to be very good preservatives against monstrous and prodigious births. And *Columella* reports farther, that many do strew grasse, and Bay-Tree boughs, and heads of Garlick, and iron nails, in the Hens nests; all which are supposed to be good remedies against thunder, that it may not marre their egges; and these also do spoil all the imperfect chickens, if there be any, before ever they grow to any ripenesse. *Ælianus* reporteth out of *Apion*, that in the time of *Oeneus* King of the South, there was seen a Crane that had two heads; and in another Kings daies, another bird was seen that had four heads. We will shew also how to hatch

A chicken with four wings and four feet,

which we learn out *Aristotle*. Amongst egges, some there are oft-times that have two yelkes, if the Hennes be fruitful: for two conceptions cling and

and grow together, as being very near each to other; the like whereof we may see in the fruits of Trees, many of them being twins, and growing into each other. Now, if the two yelks be distinguished by a small skinne, then they yield two perfect chickens without any blemish: but if the yelks be meddled one with another, without any skinne to part them, then that which is produced thereof, is a Monster. Seek out therefore some fruitful Hennes, and procure some of the perfectest egges that they lay: you may know which are for your purpose, by the bignesse of them; if not, then hold them against the Sun, and you shall discern, both whether there be in them two yelks, and also whether they be distinguished or no: and if you finde in them such plenty of matter, that you see they are for your turn, let them be sitten upon, their due time, and the chickens will have four wings and four legges: but you must have a special care in bringing them up. And as some egges have two yelkes, so there are some that have three: but these are not so common; and if they could be gotten, they would yield chickens with six wings and sixs legges, which would be more wonderful. There hath been seen a small Duck with four feet, having a broad thin bill, her fore-parts black, her hinder-parts yellow, a black head, whitish eyes, black wings, and a black circle about her neck, and her back and tail black, yellow feet, and not standing far asunder; and she is at this day kept to be seen at Torga. No question but she was generated after the same manner as we spake even now of chickens. So they report of a Pigeon that was seen which had four feet. And many such monsters we have oft-times hatcht at home for pleasure sake. So also are Serpents generated, having many heads and many tailes. *Aristotle* writes of certain Serpents, that they may be generated after the same manner, to have many heads. The Poets, and the ancient devisers of Fables, do speak much of that Hydra Lernæa, which was one of *Hercules* labours to overcome: which Fiction was without all question occasioned by these kinds of Monsters. And whilst I was imployed about the writing of this present work, there was in Naples a Viper seen alive, which had two heads, and three cloven tongues, and moved every one of them up and down. I my self have seen many Lizards that had two or three tails, which the common people most foolishly esteem to be a jest; and it cannot be but these were generated of such egges as had two yelks.

CHAP. XVIII.

Of certain other waies how to produce monstrous births.

WE may also produce Monsters by another way then that which we spake of before; for even after they are brought forth, we may fashion them into a monstrous shape, even as we list: for as we may shape young fruits as they grow, into the fashion of any vessel or case that we make for them to grow into; as we may make a Quince like a mans head, a Cucumber like a Snake, by making a case of that fashion for them to grow in; so also we may do by the births of living Creatures. *Hippocrates* in his book of Air, and Water, and Places, doth precisely set down the manner hereof; and sheweth how they do it, that dwell by the River Phasis, all of them being very long-headed, whereas no other Nation is so besides. And surely Custom was the first cause that they had such heads; but afterward Nature framed her self to that Custome; insomuch that they esteemed it an honourable thing to have a very long head. The beginning of that Custome was thus. As soon as the child was new born, whiles his head was yet soft and tender, they would presently crush it in their hands, and so cause it to grow out in length; yea they would bind it up with swathing bands, that it might not grow round, but all in length: and by this custom it came to passe, that their heads afterward grew

grew such by nature. And in process of time, they were born with such heads, so that they needed not to be so framed by handling; for whereas the generative seed is derived from all the parts of the body, sound bodies yielding good seed, but crazie bodies unsound seed; and oftentimes bald fathers beget bald children; and blear-eyed fathers, blear-eyed children; and a deformed father, for the most part a deformed childe; and the like also cometh to passe concerning other shapes: why should not also long-headed fathers generate long-headed children? But now they are not born with such heads, because that practise is quite out of use; and so nature, which was upheld by that custom, ceaseth together with the custom. So if we would produce a two-legged Dog, such as some are carried about to be seen; we must take very young whelps, and cut off their feet, but heal them up very carefully: and when they be grown to strength, join them in copulation with other dogs that have but two legs left; and if their whelps be not two-legged, cut off their legs still by succession, and at the last, nature will be overcome to yield their two-legged dogs by generation. By some such practise as you heard before, namely by handling, and often framing the members of young children, Mid-wives are wont to amend imperfections in them; as the crookednesse or sharpnesse of their noses, or such like.

Chap. XIX.

Of the wonderful force of imagination; and how to produce party-coloured births.

Plutark in his rehearsal of the opinions of Philosophers, writes, that *Empedocles* held that an infant is formed according to that which the mother looks upon at the time of conception: for, saith he, women were wont to have commonly pictures and images in great request, and to bring forth children resembling the same. *Hippocrates*, to clear a certain womans honesty that had brought forth children very unlike their parents, ascribed the cause of it to a certain picture which she had in her chamber. And the same defence *Quintilian* useth on the behalf of a woman, who being her self fair, had brought forth a Black-moor, which was supposed by all men to be her slaves son. *Damascen* reports, that a certain young woman brought forth a child that was all hairy; and searching out the reason thereof, he found the hairy image of *John Baptist* in her chamber, which she was wont to look upon. *Heliodorus* begins that excellent history which he wrote, with the Queen of Æthiopia, who brought forth *Chariclea* a fair daughter; the cause whereof was, the fable of *Andromeda* pictured in that chamber, wherein she lay with the King. We read of some others, that they brought forth horned children, because in the time of their coition they looked upon the fable of *Actaon* painted before them. Many children have hare-lips, and all because their mothers being with child, did look upon a Hare. The conceit of the mind, and the force of Imagination is great; but it is then most operative, when it is excessively bent upon any such thing as it cannot attain unto. Women with child, when they long most vehemently, and have their minds earnestly set upon any thing, do thereby alter their inward spirits; the spirits move the blood, and so imprint the likenesse of the thing mused upon, in the tender substance of the child. And surely all children would have some such marks or other, by reason of their mothers longing, if this longing were not in some sort satisfied. Wherefore the searchers out of secrets have justly ascribed the marks and signes in the young ones, to the imagination of the mother; especially that imagination which prevails with her in the chiefest actions, as in coition, in letting go her seed, and such like: and as man of all other living creatures, is most swift and fleeting in his thoughts, and fullest of conceits; so the variety of his wit affords much variety of such effects; and therefore they are more in mankind, then in other living creatures: for other creatures are not so divers minded, so that they

they may the better bring forth every one his like in his own kind. *Iacob* was well acquainted with this force of imagination, as the Scriptures witnesse: for endeavouring

To bring forth party-coloured Sheep,

he took that course which I would wish every man to take, that attempts any such enterprize. He took certain Rods and Poles of Popler, and Almond-tree, and such as might be easily barked; and cut off half the rine, pilling them by white strakes, so that the Rods were white and black in several circles, like a Snakes colour. Then he put the Rods which he had pilled, into the gutters and watering-troughs, when the Sheep came to drink, and were in heat of conception, that they might look upon the Rods. And the Sheep conceived before the Rods, and brought forth young of party-colours, and with small and great spots. A delightful sight it was. Now afterward, *Iacob* parted these Lambes by themselves, and turned the faces of the other Sheep towards these party-coloured ones, about the time of conception: whereby it came to passe, that the other Sheep in their heat, beholding those that were party-coloured, brought forth Lambs of the like colour. And such experiments might be practised upon all living Creatures that bear wool; and would take place in all kinds of beasts; for this course will prevail even in

Generating party-coloured Horses;

A matter which Horse-keepers, and Horse-breeders do practise much; for they are wont to hang and adorn with tapestry and painted clothes of sundry colours, the houses and rooms where they put their Mares to take Horse; whereby they procure Colts of a bright Bay colour, or of a dapple Gray, or of any one colour, or of sundry colours together. And *Absyrtus* teacheth the same in effect; counselling us to cover the Mares body with some stuff of that colour, which we would have the Colt to be of: for look what colour she is set forth in, the same will be derived into the Colt; for the horse that covers her, will be much affected with the sight of such colours, as in the heat of his lust he looketh on; and will beget a Colt of the same hue as the example then before his eyes doth present unto him. *Oppianus* in his first book of Hunting, writes the same argument. Such is, saith he, the industry and practisednesse of mans wit, that they can alter the colour of the young ones from the mother, and even in the wombe of their Dam procure them to be of divers colours: for the Horse-breeder doth paint the Mares back with sundry colours, (even such as they would procure to be in the Colt,) against the time that both she desires horse, & the Stallion is admitted to cover her. So the Stallion, when he cometh and sees such goodly preparation as it were for his wedding, presently begins to fome at the mouth, and to neigh after her, and is possessed with the fire of raging lust throughout his whole body, raving and taking on, that he cannot forthwith satisfie himself upon his bride. At length the Horse-breeder takes off their fetters, and lets them loose together; and the Mare admits him, and afterward brings forth a Colt of as many colours as she beheld in the time of her copulation; for as she conceives the Colt, so withal she conceives those colours which she then looks upon.

How to procure white Pea-cocks.

In former times, white Pea-cocks were such a rare sight in Colen, that every one admired them as a most strange thing: but afterward they became more common, by reason that merchants brought many of them out of Norway: for whereas black or else party-coloured Peacocks were carried into that Country to be seen, presently as they came thither, they waxed white; for there the old ones sit upon their eggs in the air, upon the tops of very high mountaines, full of snow; and by continual sitting there, it causeth some alteration in their own colour; but the young which they hatch, are white all over. And no doubt but some such courses will

take

take good effect in all kinds of birds; for if we take their Cages or Coops wherein they are kept, and their nests wherein they sit, and white them on the inside with some plastering work, or else cover them all over with white clothes or curtains, and so keep them in with grates, that they may not get out, but there couple and sit, and hatch their egges, they will yeeld unto us white broods. So if you would

Procure Pigeons of party colours,

you must take that course which *Oppianus* hath set down. At such time, as they fall to kissing their mate, and are desirous of copulation, let him that keeps them lay before their eyes sundry clothes of the bravest colours they can get, but especially purple: for the pigeons will in their heat of lust be much affected and delighted with the sight thereof, and the young ones which they bring forth, shall resemble the same colours. The subtil Fowler, saith he, that gives himself to take and to bring up birds, is well acquainted with, and is wont to practise such experiments, and very artificially procures fine colours in young Pigeons: he casteth before their sparkling eyes fine wrought tapestry, and red coverlets, and purple garments; and so whiles he feeds their eyes with pleasing sights, he steals away their imagination to the colours which they look upon, and thereby derives the very same colours into the young ones.

How to procure a shag-hair'd Dog.

In sawting time you must strew their kennels, and the places where they lie and couple, and usually haunt, with the fleeces and hides of beasts; and so, while they continually look upon those sights, they will beget shag whelps like Lions. This we heard came to passe by chance, and without any such intended purpose, that a little Bitch lying continually in a Rams fleece, when she came to be with whelp, she brought forth puppies of the like hair as the fleece was.

How to procure Swine, and other beasts to be white.

Swine-herds, and Keepers of beasts, when they would have white litters, are wont to beautifie, and to build the stables and places whither the beasts resort to lye, with white roofs and white eaves; and the Swine which were brought forth in such white sties, and the other beasts likewise that were brought forth in such whited places, became thereby white all over.

Chap. XX.

How it may be wrought, that Women should bring forth fair and beautiful children.

BY this which hath been spoken, it is easie for any man to work the like effects in mankind, and to know how to procure fair and beautiful children. Nay, Writers make mention, that these things which we speak of, have oftentimes fallen out by chance. Wherefore it was not here to be omitted. The best means to produce this effect, is to place in the bed-chambers of great men, the images of *Cupid*, *Adonis*, and *Ganymedes*; or else to set them there in carved and graven works, in some solid matter, that they may alwayes have them in their eyes: whereby it may to passe, that whensoever their wives lie with them, still they may think upon those pictures, and have their imagination strongly and earnestly bent thereupon: and not only while they are in the act, but after they have conceived and quickned also: so shall the child when it is born, imitate and expresse the same form which his mother conceived in her mind, when she conceived him, and bare in her mind, while she bare him in her wombe. And I know by experience, that this course will take good effect; for after I had counselled many to use it, there was a woman, who

who had a great desire to be the mother of a fair Son, that heard of it, and put it in practise; for she procured a white boy carved of marble, well proportioned every way; and him she had always before her eyes: for such a Son it was that she much desired. And when she lay with her Husband, and likewise afterward, when she was with child, still she would look upon that image, and her eyes and heart were continually fixed upon it: whereby it came to passe, that when her breeding time was expired, she brought forth a Son very like in all points, to that marble image, but especially in colour, being as pale and as white, as if he had been very marble indeed. And thus the truth of this experiment was manifestly proved. Many other women have put the like course in practise, and their skill hath not failed them. *Oppianus* mentions this kind of practise, that it is usual amongst the Lacedæmonians: for they, saith he, when they perceive that their wives are breeding young bones, hang up fine pictures, and place goodly images in their sight; some, of the most beautiful and handsome young men that ever mankind afforded, as of *Nireus*, *Narcissus*, and valiant *Hyacinthus*, and of other young lusty gallants that were most comely and beautiful in face, and very sightly for all the parts of their body; and some, of such excellent gods as was *Apollo* crowned with a garland of fresh coloured Bay, and *Evan* that had a Diadem of Vine-leaves about his head, and goodly hair hanging down under it: and this they did, that while their Wives stood gazing continually upon such brave pictures, and comely portraitures, they might breed and bring forth children of the same comlinesse and beauty.

CHAP. XXI.

How we may procure either males or females to be generated.

EMpedocles was of opinion, That males or females were generated according to the heat or cold that was in them; and thence it is, saith he, that the first males are reported to have been generated in the Eastern and Southern parts of the earth, but the first females in the Northern parts. But *Parmenides* quite contrary affirmed, That males were especially generated towards the North, as having in them more solidity and thicknesse; and females especially towards the South, as being more loose and open, according to the disposition of the place. *Hipponax* held, That males and females are generated, according as the seed is either strong and solid, or fluid, weak and feeble. *Anaxagoras* writes, that the seed which issueth out of the right parts of the body, is derived into the right parts of the wombe; and likewise that which issueth out of the left parts of the body, falleth into the left parts of the wombe: but if they change courses, and the right seed fall into the left cell or receit in the wombe, or the left seed into the right cell, then it generates a female. *Leucippus* held, That there was no cause either in the seed or heat, or solidity, or place, that they should be different sexes, but only as it pleases nature to mark the young ones with different genitories, that the male hath a yard, and the female a wombe. *Democritus* affirms, that either sex in every part proceeds indifferently from either parent; but the young one takes in sex after that parent which was most prevalent in that generation. *Hipponax* saith, if the seed whereof the young is begotten, prevail most, then it is a male; but if the nourishment which it receives in the breeding, prevail more then the seed, then it is a female. But all Physitians with one consent affirm, that the right side hath most heat in it; wherefore if the woman receive and retain the generative seed in the right side of her wombe, then that which she conceives, is a male; but if in the left side, it is a female. The experience whereof may be evidently seen in such living Creatures as bring forth many at one burthen: for if you cut open a Sow that is great with Pig, you shall find the Boar-pigs lying in the right side, and the Sow-pigs in the left side of her wombe. And hence it is, that Physitians counsel women, as soon as they have taken in mans seed, to turn them presently on their right side. And hence it is, that if you knit up a Rams right stone, he begets Ewe-lambs only, as *Pliny* writeth. A Bull, as soon as he hath rid a Cow, gives evident signs to any man to conjecture

jecture whether he hath begotten a Cow-calf, or a Bulchin; for if he leap off by the right side, it is certain that he hath begotten a Bulchin; if by the left side, then a Cow-calf. Wherefore the Ægyptians in their Hieroglyphicks, when they would signifie a woman that hath brought forth a daughter, they make the character & likeness of a Bull looking toward the left side; but to signifie the birth of a son, they make his character as looking toward the right side. But if you desire to have a male generated, *Africanus*, *Columella*, and *Didymus* counsel you to knit up the left stone of the Sire; if a female, then to knit up his right stone; at such times as he is to be coupled for generation. But because this would be too much to do, where there is great store of cattel, we may assay it by another means. Northern blasts help much to the conception of a male, and Southern blasts to the conception of a female, as *Pliny* reporteth: the force of the Northern air is such, that those beasts which are wont to procreate females only, this will cause to bring forth males also. The Dams at the time of their copulation, must be set with their noses into the North: and if they have been used to coition still in the morning, you must not put them to it in the afternoon, for then they will not stand to their mate. *Aristotle*, a man most subtile, and exquisitely seen in the works of nature, willeth us, that about the time of gendering, we should wait for some Northern blasts in a dry day, and then let the flock feed against the winde, and so let them fall to copulation: if we would procure females to be generated, then we must so wait for Southern blasts, and let them stand with their heads towards the South as they are in copulation; for so not only *Aristotle* counselleth, but *Columella* and *Ælianus* also: for it is a rule that *Ælianus*, *Pliny*, *Africanus* and *Didymus* do all give, that if the cattel, as soon as they have been covered, do turn themselves toward the Southern winde, then certainly they have conceived females. There is also some cause of the procreation of a male, or of a female, in the begetters themselves; nay further, some cause thereof may be the force and operation of some waters: for sometimes the waters cause that a male or female be generated. There is, not far from the City Pana, a certain River called Milichus; and not far from that, another River called Charadius; whereof if the beasts drink in the Spring-time, they commonly bring forth all males: for which cause the Shepherds there drive away their flocks at that time, and feed them in that part of the Country which lieth farthest off from that River; as *Pausanias* writeth in his Achaica.

Chap. XXII.

Of divers experiences that may be, and have been practised upon divers living Creatures.

THere remain now certain experiments of living Creatures, both pleasant, and of some use, which we have thought good here to set down, to save a labour of seeking them any further. And first,

How to make Horses have white spots on them.

It is a thing required in the art of trimming of Horses, to be able to cause white spots to grow in some parts of them; for crafty Horse-coursers are wont to counterfeit white spots in the forehead, or left thigh, or right shoulder of an Horse, thereby to deceive such men, as are wont to gesse at the goodnesse and qualities of a horse, by the conjecture of such marks. And this their counterfeit practise hath been detected by this chance; that the hair of a horses skin being galled off in any place, after a while hoary hairs have grown up there of themselves; and it is not unlikely but that this chance taught them that practise. The manner of the doing it, is, first to shave off the hair in that place where you would have a white spot; and then rub off, or cut the upper skin, and so you shall there have a white patch. But *Oppianus* speaking of the same experiment, shews that it is to be done by fire. There be some Horses, saith he, that are full of white round spots intermingled with

with their black colour: it cometh by the industry of the Horse-breeder, who when they are yet tender and young, cunningly burns off their hair with an hot iron. But on the contrary, if you would have

The hairs of a wounded or galled place, to grow up of the same colour, as the other hair is of,

Tiberius hath taught the way how to do it. You must knead three pints of bruised or ground barley, and put to it the froth of nitre and a little salt, and make it into loaves; then you must put them into an Oven till they are burned to coals; afterward crush them, and beat them to powder, and then mix them with oyle, and anoint the sore or the scar therewith; and this you must do for twenty daies. But what should be the reason that this barley ashes should cause, not white hairs, but the like in colour to the rest, to grow upon the scars or sores of horses whereupon it is cast, that, *Alexander Aphrodisæus* ascribes to this, because barley hath in it a purgative and cleansing force, and so wasteth and expelleth the humors, and all the naughty stuff, that was gathered by the sore into that part, because it was maimed, and consequently not so well able to relieve it self. Neither yet will I here omit that toyish experiment whereby we may

Procure in Oxen a counterfeit shew of fatnesse.

If you take an Oxe well grown in years, and make a hole into his thigh, and blow wind thereby into him, and afterward give him meat, he will shew fat, though indeed he be very lean. We may also, by giving them some kind of water to drink

Cause the fleeces and hides of cattel to be of divers colours,

as *Ælianus* sheweth. The River Crathis affords one channel that makes beasts white: for Oxen and Sheep, and all four-footed beasts, as *Theophrastus* saith, as soon as they drink of it, become white, though before they were red or black. In Eubœa, all for the most part, are white Oxen by nature. Sheep, by reason of the diversity of water which they drink, do diversly change their colour; the force and nature of the Rivers working this change in them, especially at every ramming time. Some are turned from black to white, and contrariwise, some are turned from white to black: these alterations are commonly seen neer to the River Antandrus, and neer also to a certain River in Thracia. The River Scamander, which is neer unto Troy, makes as many Sheep as drink of the water thereof, to become yellow. We may also conjecture and foresee by certain outward bodily signs in the Dam or Sire,

What colour their young ones will be of.

To foreknow the colour of young Mules, we must take special example of the hairs of their Dams ears and eye-lids: for howsoever the rest of their body is of one and the same colour, yet in those two parts we may discern so many and such colours as the foal shall have, as *Columella* writeth. So if you look under the Rams tongue, you shall there find certain veins; which if they be black, then will the Lambs be black also; but if they be white, then he hath begotten white Lambs: for look what colour these veins are of, with the same colour will the fleece of the Lambe be overspread; insomuch that if there be sundry colours in them, there will be also sundry like colours upon the Lambes, as *Aristotle*, *Democritus* and *Didymus* do witnesse. Now, how we may

Know by the egge, whether the chick when it is hatcht, will be a Cock or a Hen,

Aristotle teacheth us: for, saith he, if the egge be exactly round, then it will yield a

a Cock-chicken; but if it be somewhat long, then it yields an Hen-bird: the reason is, because in things that are round, the natural heat is more kindly and strongly compacted together.

How to make a bird sociable and familiar with thee.

Now we will speak of the sociablenesse and familiarity which a certain Pie had with a friend of mine: who by this pretty device did make the Pie so well acquainted with him, and so serviceable to him, that she would flie unto him, not only for the supplying of her daily wants, but as it were for love, never forsaking him night or day. The device was this. While she was yet unfeathered in the nest, he broke off her lower beak, even to her very jaws, that the poor wretch could not eat any meat but that which was put into her mouth with hands; and he himself gave her with his own hands all the meat she did eat. After that, she would flie to his trencher at dinner and supper, and would prate and chat unto him very flippant; insomuch that nothing could be spoken in the house, but she would imitate it, and speak it again; and not only frame her tongue to their words, but her body also to the imitating and resembling of their actions. And he was wont still to leave her loose at home, and she would flie about everywhere, but still at dinner and supper times she would return home. It fell out that the man had occasion to go from home fifteen or sixteen days journey: she would alwayes bear him company, now and then flying a great way before him, and would sit still upon a bough till he came at her; and then she would leap upon his cap and his shoulders, frisking about him for very joy; and sometimes staying behind him; and then when he was gone a great way before, she would in all haste flie away after to overtake him: and she was also his continual bedfellow; and yet to this day he hath her, and enjoyeth her familiar company. But, concerning the general transmutation and change of living creatures, let these things be sufficient which we have already spoken.

THE THIRD BOOK OF Natural Magick:

Which delivereth certain precepts of Husbandry; and sheweth how to intermingle sundry kinds of Plants, and how to produce new kinds.

The PROEME.

WE have rehearsed concerning divers kinds of new living Creatures; now shall I speak of Plants, which ravish with admiration the eyes and minds of those that contemplate on them, with their abundant pleasantnesse, and wonderful Elegancy. These bring more profit, and by these a natural Philosopher may seem more admirable. For use made with the earth, is more honest and honourable then with other things; and the ground never grows old or barren, but is everywhere naturally rank to receive new seed, and to produce new; and is ever unsatisfied in fruitfulnesse, and brings perpetual increase: and if nature be alwayes admirable, she will seem more wonderful in Plants. Copulation was but of one kind, here it is almost infinite; and not onely every Tree can be ingrafted into every Tree, but one Tree may be adulterated with them all. Living Creatures of divers kinds were not easily produced, and those that come from other Countries were hard to get: here is no difficulty at all; grafts are fetcht and sent, if need be, to any part of the world. And if diversity of Creatures are made in Africa, by their copulating when they meet at the Rivers, that so new creatures are alwayes produced; here in Italy, where the Air is alwayes calme, and the Climate very indulgent, strange and wilde plants find a good harbour, and ground to grow in, which is the mother and nourisher of all, and so fruitful to produce new and diversity of plants, that it can hardly be exhausted. And we can better write of them, and know the truth more then others, because we have them still before our eyes, and an opportunity to consider of their effects. And if our Ancestors found many new things, we by adding to theirs, have found many more, and shall produce more excellent things overpassing them, because daily by our art, or by chance; by nature, or new experience, new plants are made. Diodorus *writes, that the Vine at first was but one, and that was wilde; but now by the help of* Bacchus *alone, from the quality of the ground, the nature of the climate, and the art of planting, it is varied into many kinds, that it were madnesse to number them up, and not worth our time. Nature brought forth but one kind of Pear-tree: now so many mens names are honoured by it, that one is called* Decumana, *another* Dolabelliana, *and another is named from* Decumius *and* Dolabella. *The same thing is observed in Figges, of* Livy *and* Pompey. *Quinces are of many kinds; some called* Mariana *from* Marius, Manliana *from* Manlius, Appiana Claudiana *from* Appius Claudius, Cestiana *from* Cestius: *their varieties have made the Authors names immortal. What shall I say of Laurel cherries, found in* Pliny *his time? what of Citrons? which as* Athenæus *saith, were too sharp to eat in the days of* Theophrastus, *and the ancestors of* Plutark *and* Pliny; *but* Palladius *made them to become sweet. What of the Peach, and Almond-peach Nuts, fruits our fore-fathers knew not, yet now are they eaten, being pleasant and admirable? what of Clove-gilliflowers, that the Gardners Art hath made so dainty and sweet scented? and so of other plants I have everywhere set down in this work? Our Naples abounds so with them, that we would not go forth to see the Orchards of the Hesperides, Alcinus, Semiramis, and at Memphis, that were made to hang above ground. But I shall briefly and plainly relate the History.*

Chap.

Chap. I.

How new kinds of Plants may be generated of putrefaction.

AS we have shewed before, that new kinds of Living Creatures may be generated of putrefaction; so, to proceed in the same order as we have begun, we will now shew that new kinds of Plants may grow up of their own accord, without any help of seed or such like. The Antients questionless were of opinion, that divers plants were generated of the earth and water mixt together; and that particular places did yield certain particular plants. We rehearsed the opinion of *Diogenes* before, who held that plants are generated of water putrified in it self, and a little earth tempered therewith. *Theophrastus* held, that the rain causeth much putrefaction and alteration in the earth, and thereby plants may be nourished, the Sun working upon it with his heating, and with his drying operation. They write also, that the ground when it is stirred, brings forth such kinds of Plants alwaies, as are usuall in the same place. In the Isle Creta, the ground is of that nature, that if it be stirred anywhere, and no other thing sown or planted in it, it will of it self bring forth a Cypresse-tree: and their tilled lands, those that are somewhat moist, when they lie fallow, bring forth thistles. So the herb Laser in Africa, is generated of a kind of pitchy or clammy rain and thick dirt; and the herb will shew it self out of the earth presently after the rain is fallen. *Pliny* said, that the waters which fall from above, are the cause of every thing that grows upon the earth, nature shewing therein her admirable work and power: and many such things they report, which we have spoken of in the books of the knowledge of Plants. And I my self have oft-times by experience proved, that ground digged out from under the lowest foundations of certain houses, and the bottom of some pits, and laid open in some small vessel to the force of the Sun, hath brought forth divers kinds of Plants. And whereas I had oftentimes, partly for my own pleasure, and partly to search into the works of Nature, sought out and gathered together earths of divers kinds, I laid them abroad in the Sun, and watered them often with a little sprinkling, and found thereby, that a fine light earth would bring forth herbs that had slight stalkes like a rush, and leaves full of fine little ragges; and likewise that a rough and stiff earth full of holes, would bring forth a slight herbe, hard as wood, and full of crevises. In like manner, if I took of the earth that had been digged out of the thick woods, or out of moist places, or out of the holes that are in hollow stones, it would bring forth herbs that had smooth blewish stalkes, and leaves full of juice and substance, such as Peny-wort, Purslane, Senegreek, and Stone-croppe. We made trial also of some kinds of earth that had been farre fetcht, such as they had used for the ballast of their Shippes; and we found such herbs generated thereof, as we knew not what they were. Nay further also, even out of very roots and barks of Trees, and rotten seeds, powned and buried, and there macecrated with water, we have brought forth in a manner the very same herbs; as out of an Oken root, the herb Polypody, and Oak-fern, and Splenewort, or at least such herbs as did resemble those, both in making and in properties. What should I here rehearse, how many kinds of toad-stools and puffs we have produced? yea, of every several mixture of putrified things, so many several kinds have been generated. All which I would here have set down, if I could have reduced them into any method; or else if such plants had been produced, as I intended: but those came that were never

sought for. But happily I shall hereafter, if God will, write of these things, for the delight, and speculation, and profit of the more curious sort: which I have neither time nor leisure now to mention, seeing this work is ruffled up in haste. But let us see

How Toad-stools may be generated.

Dioscorides, and others have written, That the bark of a white Poplar-Tree, and of a black, being cut into small pieces, and sowed in dunged lands or furrows, will at all times of the year bring forth mushromes or toad-stools that are good to be eaten. And in another place he saith, that they are more particularly generated in those places, where there lies some old rusty iron, or some rotten cloth: but such as grow neer to a Serpents hole, or any noisom Plants, are very hurtful. But *Tarentinus* speaks of this matter more precisely. If, saith he, you cut the stock of a black Poplar peece-meal into the earth, and pour upon it some leaven that hath been steeped in water, there will soon grow up some Poplar toad-stools. He addeth further; If an up-land or hilly field that hath in it much stubble and many stalks of corn, be set on fire at such time as there is rain brewing in the clouds, then the rain falling, will cause many toad-stools there to spring up of their own accord: but if, after the field is thus set on fire, happily the rain which the clouds before threatned doth not fall; then, if you take a thin linnen cloth, and let the water drop through by little and little like rain, upon some part of the field where the fire hath been, there will grow up toad-stools, but not so good as otherwise they would be, if they had been nourished with a showre of rain. Next we will shew

How Sperage may be generated.

Dydimus writes, That if any man would have good store of Sperage to grow, he must take the horns of wilde Rams, and beat them into very small powder, and sow them in eared ground, and water it, and he shall have his intent. There is one that reports a more strange matter; that if you take whole Rams horns not powned into small pieces, but only cut a little, and make a hole in them, and so set them, they will bring forth Sperage. *Pliny* is of *Didymus* opinion, that if the horns be powned and digged into the earth, they will yield Sperage; though *Dioscorides* thinks it to be impossible. And though I have made often trial hereof, but could not find it so to be, yet my friends have told me of their own experience, that the same tender seed that is contained within the Rams horn, hath produced Sperage. The same my friends also have reported

That Ivy doth grow out of the Harts horn;

and *Aristotle* writes of an Husband-man that found such an experiment; though for my own part I never tried it. But *Theophrastus* writes, that there was Ivy found growing in the Harts horn; whereas it is impossible to think how any Ivy seed could get in there: and whereas some alledge, that the Hart might have rubbed his horn against some Ivy roots, and so some part of the horn being soft and ready to putrifie, did receive into it some part of the root, and by this means it might there grow; this supposal carries no shew of probability or credit with it. But if these things be true, as I can say or see nothing to the contrary, then surely no man will deny but that divers kinds of plants may be generated of divers kinds of living Creatures horns. In like manner, may plants be generated of the putrified barks and boughs of old Trees: for so is

Polypody, and the herb Hyphear generated;

for both these, and divers other plants also, do grow up in Firre-trees, and Pine-trees, and such other: for in many Trees, neer to the bark, there is a certain flegmatick or moist humour, that is wont to putrifie; which, when it abounds too much within, breaks forth into the outward shew of the boughs and the stock of the Tree;

and there it meets with the putrified humour of the bark; and the heat of the Sun working upon it there, quickly turns it into such kinds of herbs.

Chap. II.

How Plants are changed, one of them degenerating into the form of the other.

TO work Miracles, is nothing else (as I suppose) but to turn one thing into another, or to effect those things which are contrary to the ordinary course of Nature. It may be done by negligence, or by cunning handling and dressing them, that plants may forsake their own natural kind, and be quite turned into another kind; wholly degenerating, both in taste, and colour, and bignesse, and fashion: and this I say may easily be done, either if you neglect to dresse or handle them according to their kind, or else dresse them more carefully and artificially then their own kind requires. Furthermore, every plant hath his proper manner, and peculiar kind of sowing or planting; for some must be sowed by seed, others planted by the whole stem, others set by some root, others graffed by some sprig or branch: so that if that which should be sowed by seed, be planted by the root, or set by the whole stock, or graffed by some branch; or if any that should be thus planted be sowed by seed; that which cometh up will be of a divers kinde from that which grows usually, if it be planted according to its own nature, as *Theophrastus* writes. Likewise if you shall change their place, their air, their ground, & such like, you pervert their kind; and you shall find that the young growing plant will resemble another kind, both in colour and fashion; all which are clear cases by the books of Husbandry. Some examples we will here rehearse. If you would change

A white Vine into a black, or a black into a white;

sow the seed of a white Garden-Vine, and that which cometh of it, will be a black Wilde-vine; and so the seed of a black Garden-vine will bring forth a white Wilde-vine, as *Theophrastus* teacheth. The reason is, because a Vine is not sowed by seed, but the natural planting of it is by sprigs and roots. Wherefore if you deal with it otherwise then the kind requires, that which cometh of it must needs be unkindly. By the like means

A white Fig-tree may degenerate into a black,

for the stone of a Fig, if it be set, never brings forth any other but a wilde or a wood Fig-tree, and such as most commonly is of a quite contrary colour; so that of a white figtree it degenerates into a black, and contrariwise a black fig-tree degenerates into a white. Sometimes also, of a right and noble Vine is generated a bastard Vine, and that so different in kind oftentimes, that it hath nothing of the right garden-vine, but all meerly wilde. In like manner also are changed

The red Myrtle and the red Bay-tree into black,

and cannot chuse but lose their colour: for these likewise degenerate, as the same *Theophrastus* reports to have been seen in *Antandrus*; for the Myrtle is not sowed by seed, but planted by graffing; and the Bay-tree is planted by setting a little sprig thereof that hath in it some part of the root, as we have shewed in our discourse of Husbandry. So also are

Sweet Almonds and sweet Pomegranates changed into sowre ones.

for the stones or kernels of the Pomegranates are changed from their right blue, into a baser colour; and the Pomegranate it self, though it be never so good, degenerates into a hard, and commonly a sharp fruit. The Almond degenerates likewise both in taste, and also in feeling; for of a soft one cometh a harder: therefore we are counselled to graffe him when he is prettily well grown, or else to change him, and shift him oft. An Oak likewise will become worse: and therefore whereas the best grows in Epyrus, and many have planted the same elsewhere, yet they could never

never produce the like of that. In like manner, of the kernel of the natural Olive cometh a wilde Olive; (and they that say that the male Cypresse-tree for the most part degenerates into a female;) and in processe of time there is such a change, that it agreeth in nothing with the natural Olive, but is so stark wilde, that sometimes it cannot bring forth fruit to any perfection. *Varro* saith that

Coleworts are changed into Rape, and Rape into Coleworts.

Old seed is of so great force in some things, that it quite changeth the nature; for the old seed of Coleworts being sowed, brings forth Rape; and contrariwise, old Rape-seed degenerates into Coleworts. By labour also and dressing

The Corn Typha, and Spelt, are changed into Wheat, and Wheat into them;

for this may be done, if you take them being of a thorough ripenesse, and knead them, and then plant them; but this will not so prove the first nor the second year; but you must expect the proof of it in the third year, as *Theophrastus* sheweth. *Pliny* writeth, that the Corn Siligo is changed into Wheat the second year. So all seeds, either by reason that they are neglected, or because there is some indisposition either in the earth, or the air where they are, do oft-times degenerate from the excellency and goodnesse of their kind, and become worse. *Virgil* hath observed it: I have seen, saith he, the best and choicest things that were most made of, at length yet to degenerate, unlesse mans industry did yearly supply them with his help: so fatal it is for all things to wax worse and worse, and still to have need to be renewed. *Galens* father, a man very studious of Husbandry, especially in his old age, bestowed great pains and diligence to find out, whether the annoyances of fruits, that which mars their pure goodnesse, did spring up of it self, or arise out of any seeds of the fruits themselves, which did degenerate into other kinds. Wherefore he took the purest, and the cleanest Wheat and Barley that he could get, and having picked out all other seed whatsoever, sowed them in the ground: and when he found much Tares growing in the Wheat, but very little in the Barley, he put the same experiment in other grain in practice; and at last found in Pulse a hard and round Fetch; and moreover, that the herb Axesceed did grow among Pulse, by a kind of degeneration of the Pulse into Axesceed. So, unlesse it be prevented by skill and pains,

The herb Ballamint will turn into a Mint.

Wherefore it must be often shifted and translated from place to place, lest it so degenerate, as *Theophrastus* counselleth; for when a man doth not look to it and dresse it, the roots thereof will grow very large, and thereby the upper part being weakned, loseth the ranknesse of his savour; and that being lost, there remains in it but a weak smell, the very same in a manner that is in a common Mint. I my self have sowed Mint seed, and it hath been changed into wilde Peny-roial; I mean, in savour onely: for the fashion of the Mint remained still in it. *Martial* writes, That

Basil-royal degenerates into wilde Betony,

if it be laid open to the Suns hotest and greatest force: for then it will bring forth sometimes purple flowers, sometimes white, and sometimes of a Rosie colour. And it will not only degenerate into Betony, but into Ballamint also. Likewise the boughs of the shrub Casia, as *Galen* reporteth, will degenerate into Cinamon. Likewise

Cloves, Roses, Violets, and Gilli-flowers, of purple, will become white,

either by reason that they are old, or else if they be not well looked unto. For *Theophrastus* records, that Violets, Roses, and Gilli-flowers, if they be not well heeded, in three years will wax white; and the experience thereof I my self have plainly seen. Neither yet will Plants degenerate one into another, only in such case as where there is a kind of vicinity and likenesse of nature, but also where there

there is no such vicinity, one plant may be changed into another of a quite different kind: for

An Oak may be changed into a Vine.

Albertus reporteth, (if the thing be as true as it is strange; but let the truth thereof lie upon his credit) he reports, I say, that Oaken or Beechen boughs being ingraffed into the Tree Myrica, is quite changed into it; and so into the Tree called Tremisca, which is a baser kind of wood: and likewise if Oaken boughs be set in the ground of Alummum, a place so called, they will be quite altered into right Vines, such as their grapes yeeld good wine; and sometimes the old Oaks, if they be pared, degenerate into Vines. But we must not think that this change is made while those Trees or boughs last; but when once they are putrified, then the nature of the ground works into them, and changeth them into Vines.

Chap. III.

How to make one fruit compounded of many.

As we heard before of divers living Creatures, that they might be mingled into one, by copulation; so now we will shew also how to contrive divers kinds of fruits, by graffing into one fruit: for graffing is in plants the same that copulation is in living creatures: yet I deny not, but there are other means whereby this may be effected, as well as by graffing. But above all other, graffing is most praise-worthy, as being the best and fittest means to incorporate one fruit into another, and so of many to make one, after a wonderful manner. And whereas it may be thought a very toilsome, and indeed impossible matter, here the excellent effect of the work must sweeten all thy labour, and thy painful diligence will take away the supposed impossibility of the thing, and perform that which a man would think were not possible to be done. Neither must thou suffer thy self to be discouraged herein by the sayings of rude Husband-men which have attempted this thing, but for want of skill could not perform it, seeing experience teacheth thee that it hath been done. Wherefore against such discouragements, thou must arm thy self with a due consideration of such experiments as the Antients have recorded: as for example, that the Figge-tree may be incorporated into the Plane-tree, and the Mulberry-tree; and likewise the Mulberry-tree into the Chestnut-tree, the Turpentine-tree, and the white Poplar, whereby you mayest procure white Mulberries; and likewise the Chestnut-tree into a Hasel, and an Oak; and likewise the Pomegranate-tree into all Trees, for that it is like to a common whore, ready and willing for all Comers; and likewise the Cherry-tree into a Turpentine-tree: and to conclude, that every Tree may be mutually incorporated into each other, as *Columella* supposeth. And this is the cause of every composition of many fruits into one, of every adopted fruit which is not the natural child, as it were, of the Tree that bare it; and this is the cause of all strange and new kinds of fruits that grow. *Virgil* makes mention of such a matter, when he saith, that *Dido* admired certain Trees which she saw, that bare new kinds of leaves, and apples that naturally were not their own. And *Palladius* saith, that Trees are joined together as it were, by carnal copulation, to the end that the fruit thereof might contain in it, all the excellencies of both the parents: and the same Trees were garnished with two sorts of leaves, and nourished with two sorts of juices, and the fruit had a double relish, according to both the kinds whence it was compounded. But now, as we did in our tract of the commixtion of divers kinds of living Creatures; so here also it is meet to prescribe certain rules, whereby we may cause those divers plants which we would intermingle, to join more easily, and to agree better together, for the producing of new and compounded fruits. First therefore, we must see that either of the Trees have their bark of one and the same nature: and both of them must have the same time of growing and shooting out of their sprigs; as was required in living creatures, that both of them should have the same time of breeding their

young

young ones: for if the graffe have a dry or a hard bark, and the stock have a moist or soft bark, or that they be any way contrary each to other, we shall labour in vain. Then we must see that the ingraffing be made in the purest and soundest place of the stock, so that it neither have any tumors or knobs, or any scars, neither yet hath been blasted. Again, it is very material, that the young graffes or shoots be fetcht from the most convenient place or part of the Trees; namely, from those boughs that grow toward the East, where the Sun is wont to rise in the Summer-time. Again, they must be of a fruitful kind, and be taken off from young plants, such as never bare fruit before. They must also be taken in their prime, when they are beginning first to bud, and such as are of two years growth, and likely to bear fruit in their second year. And the stocks into which they are to be engraffed, must likewise be as young as may be graffed into; for if they be old, their hardnesse will scarce give any entertainment to strange shoots to be planted upon them. And many such observations must be diligently looked into, as we have shewed in our book of Husbandry. But we must not here omit to speak of the lome, or that clammy morter, which makes

The Graffe and the stock to close more easily together;

for it is very helpful to glew or fasten the skins of both the barks one into the other: and if the barks be of a divers nature, yet by this lome they may be so bound into one, that they will easily grow together. And surely it is commodious in many respects. First, because, as in mans body, the flesh being wounded or pierced into, is soon closed up again with stiffe and clammy plaisters applyed thereunto; so the bark or the boughs of Trees being cut or rent, will close together again very speedily, by the applying of this morter. For if you pill the bark off from a Tree, or slip off a little sprig from a bough, unlesse you close it up so cunningly, that it may stick as fitly every way in the graffing as whilst it grew, it will soon wither, and fade, and lose the natural juice and moisture; which inconvenience this lome will prevent, and fit them one into another. Moreover, if there be any open chink betwixt the bark and the Tree, presently the air getteth in, and will not suffer them to close; therefore to make it sure that they may close without fail, this lome is needful. And whereas there are some Trees which cannot away to be harboured in any of another kind, this lome will knit them so strongly into the stock, that they cannot but bud and blossom. But here we must observe, that this glue or morter must be as neer of the nature of the thing engraffed as may be; for then it will perform this duty more kindly. If you be diligent herein, you may do many matters. We will give you a taste of some, that by these you may learn to do the like. Pill off the bark of Holly, and make a pit in some moist ground, and there bury your Holly rines, and let them there putrifie, which will be done in twelve daies: then take them forth, and stamp them till you see they are become a clammy slime. This is also made of the fruit Sebesten in Syria; and likewise it may be made of ordinary birdlime: but the best of all is made of the rines of Elm-roots stamped together; for this hath a special quality, both to fasten, and also to cherish. But let us return to graffing, which is of such great force, that it hath caused a new kind of a bastard fruit that was never heard of before, namely

An Apple compounded of a Peach-apple, and a Nut-peach;

which kind of compound generation, was never seen, nor heard of, nor yet thought upon by the Ancient. This is to be done by a kind of graffing which they call emplastering. Take off two young fruitful sprigges, one from a Peach-apple Tree, and the other from the Nut-peach Tree; but they must be well growen, and such as are ready to budde forth. Then pare off the bark of them about two fingers breadth in compasse, so that the budde to be graffed may stand

stand fitly in the midst betwixt them both; but you must do it charily, lest you perish the wood. Then cleave them thorough the middle a little way, that they may be let one into another, and yet the cleft not seen, but covered with the bud. Then take off a bud from one of those Trees, with the bark round about the bud, and set it into the midst of the boughs which we spake of before; and so engraffe them together into the other Tree, having first cut out a round fit place for them therein. They must be engraffed in that part of the Tree, which is most neat and fresh-coloured; the sprigs that grow about that place must be cut off, lest they withdraw the nourishment from the graffe, which requires it all for it self. And when you have so done, binde it about gently, that you hurt it not; and cover it with somewhat, lest the rain fall down upon it; but especially take heed to the cleft, and the place where you pilled off the bark, that you plaister it up well with morter. Thus if you do, the graffe will very kindly prosper, and the bud grow forth into a fruit that is compounded of both kinds, and it shall carry the hue both of the Peach-apple and the Nut-peach by equal proportion, such as was never seen before. By this means also we may procure the bringing forth

Of a Figge halfe white and half black;

for if we take the buds of each of them, paring them off together with the bark round about them, and then cut them in the middle, and put the half of one, and the half of the other together, and so emplaister them into the Tree, as we spake before, the fruit thereof will be a Figge half white and half black. So also

Pomegranates may be brought forth, which will be sweet on the one side, and sowre on the other;

If you take either the shoots or the buds of each of them, and after you have divided them in the midst, put the half of each together, as before was spoken. But this may be done best upon the shoots or sprigs; for the bud can hardly be pared off, nor well divided, because the bark is so weak, and so thin, and slender, that it will not endure to be much or long handled. Likewise

Orenges compounded of divers kinds, and such as are half Limons; as also Limons half sweet, and half sowre, may be produced,

if we mix them after the same manner as we spake before; for these are very fit to be graffed by emplastering; and these kinds of compound Orenges and Limons are very commonly to be seen in many Orchards in Naples. In like manner we may mingle and compound

A Peach of the white and the red Peach,

if we put those two kinds together, by such emplastering: for there are of this compound fruit to be sold in Naples at this day. Likewise we may procure

A grape that hath a kernel or stone half black, and diversly coloured.

We must deal by the shoots of Vines, as we shewed before was to be done by the buds of other Trees; cleave them in the middle, and binde two shoots or more of divers sorts of Vines handsomely together, that they may grow up in one, and graff them into a fruitful Vine of some other kind. And the same which we have shewed concerning fruits, may be as well practised also upon flowers. As for example; If we would produce

Roses that are half white and half red;

we must take the sprigs of a white Rose, and of a red, and pare off the buds of each of them; and having cut them asunder in the middle, put the halfs of each together, as we spake before, and engraffe them artificially into the bark, and then have a diligent care still to cherish them, the compound bud wil in due season bring forth Roses which will be white of the one side, and red of the other. But if you would

make trial hereof in Clove-gilli-flowers, and desire

To produce some that are half red,

seeing they have no buds at all, you must practise this experiment upon their root; you must take two roots of them, and cleave them in the middle, and match them fitly together, that they may grow each to other; and binde them up well, and then will they yeeld compound Clove-gilli-flowers: of which kind we have great store, and they are common amongst us everywhere; and they do not onely bring forth party-coloured flowers, but the very same bough, and one and the same sprig, will bear white ones and red ones, and such as are wrought and as it were embroidred with divers goodly colours, most pleasant to be seen.

CHAP. IV.

Of a second means whereby fruits may be mingled and compounded together.

THere is also a second way of compounding divers kinds of fruits together; namely, by another manner of graffing. As for example; If we would produce

Pomegranates compounded of divers kinds,

Theophrastus sheweth us how to do it. We must take the young slips or branches of divers kinds, and bruise them with a Beetle, so that they may stick and hang together; and then binde them up very hard each to other, and set them in the ground: and if they be well laid together, all those slips will grow up jointly into one Tree; but so, that every one of them retains his own kind, and receives his several nourishment by it self, and severally digests it: and the chief community which they have all together, is their mutual embracing each of other. The same *Theophrastus* teaches us in the same place,

How one and the same Vine-branch may bring forth a black and a white grape both together; and how in the same grape may be found a white and black stone hanging together.

Take the branch of a white Vine, and another of the black, and the uppermost half of either of them must be bruised together; then you must match them equally, and binde them up together, and plant them: for by this means they will grow up both into one joint; for every living thing may be matcht with another, especially where one is of the same or the like kind with the other: for then if they be dissolved, as these are in some sort when they are bruised, their natures will easily close together, and be compact into one nature: but yet either of these branches hath his several nourishment by it self, without confusion of both together; whereby it cometh to passe, that the fruit arising from them is of a divers nature, according as either of the sprigs requireth. Neither ought this to seem strange, that both of them concurring into one, should yet retain each of them their severall kind, seeing the like hereof may be found in certain Rivers which meet together by confluence into one and the same channel, and yet either of them keeps his own several course and passage; as do the Rivers Cephisus and Melas in Bœotia. *Columella* teacheth us to do this thing on this manner. There is, saith he, a kind of engraffing, whereby such kind of grapes are produced, as have stones of divers kinds, and sundry colours; which is to be done by this means. Take four or five, or more (if you will) Vine-branches of divers kinds, and mingle them together by equal proportion, and so binde them up. Afterward put them into an earthen pipe or a horn fast together; but so, that there may be some parts of them seen standing out at both ends; and those parts so standing forth, must be dissolved or bruised: and when you have so done, put them into a trench in the ground, covering them with muck, and watering them till they begin to bud. And when the buds are grown fast together, after two or three years, when they are all knit and closed into one,

then break the pipe, and neer about the middle of the stalk beneath the sprouts, there where they seem to have most grown together, cut off the Vine, and heal that part where it is so cut, and then lay it under the ground again about three fingers deep: and when that stalk shall shoot up into sprigs, take two of the best of them, and cherish them, and plant them in the ground, casting away all the other branches; and by this means you shall have such kinds of grapes as you desire. This very same experiment doth *Pliny* set down, borrowing it of *Columella*. But *Didymus* prescribes it on this manner. Take two Vine-branches of divers kinds, and cleave them in the middle; but with such heedful regard, that the cleft go as far as the bud is, and none of the pith or juice be lost; then put them each to other, and close them together, so that the bud of either of them meet right one with the other: and as much as possibly may be, let them touch together, whereby both those buds may become as one: then binde up the branches with paper as hard together as you can, and cover them over with the Sea-onion, or else with some very stiff clammy earth; and so plant them, and water them after four or five daies, so long till they shoot forth into a perfect bud. If you would produce

A Fig, that is half white, and half red;

Leontinus teacheth you to do it after this manner. Take two shoots of divers kinds of Fig-trees; but you must see that both the shoots be of the same age, and the same growth as neer as you can: then lay them in a trench, and dung them, and water them. And after they begin to bud, you must take the buds of each, and binde them up together, so that they may grow up into one stalk: and about two years after, take them up, and plant them into another stock, and thereby you shall have Figs of two colours. So then by this means

All fruits may be made to be party-coloured;

and that not onely of two, but of many colours, accordingly as many kinds of fruits may be compounded together. And surely these experiments are very true, though they be somewhat hard to be done, and require a long times practice, as I my self have had experience. The like experiment to these is recorded by *Palladius*, and by other Greek Writers, who shew the way

How a Vine may bring forth clusters of grapes that are white, but the stones of the grapes black.

If white and black Vines grow neer together, you must shred the branches of each, and presently clap them together so, that the bud of either may meet right together, and so become one: then binde them up hard in paper, and cover them with soft and moist earth; and so let them lie three dayes or thereabouts: after that, see that they be well and fitly matcht together, and then let them lie till a new bud come forth of a fresh head: and by this means you shall procure in time, divers kinds of grapes, according to the divers branches you put together. I my self have made choice of two shoots of two divers Vines growing one by another; I have cleft or cut them off in that place where the buds were shooting forth, leaving the third part of the bud upon the branch; I fastened them together, and bound them up into one very fast, lest when the buds should wax greater, one of them might flie off from the other: I fitted them so well, branch with branch, and bud with bud, that they made but one stalk; and the very same year they brought forth grapes that had cloven kernels or stones. This shoot so springing up, I put to another; and when that was so sprung up, I put that also to another; and by this continual fitting of divers sprigs one to another, I produced clusters of divers-coloured and divers-natured grapes: for one and the same grape was sweet and unsavoury; and the stones were some long, some round, some crooked; but all of them were of divers colours. *Pontanus* hath elegantly shewed

How Citron-trees may bear divers kinds;

namely, by joining two sundry boughs together, after the bark hath been pared away,

away, and fastning each to other with a kind of glue, that they may grow up one as fast as the other; and when they are engraffed into one stock, they must be very carefully covered and looked unto, and so one and the same branch will bring forth fruit of divers kinds. So you may procure

An Orenge-tree to bring forth an Apple half sweet and half sowre.

And this kind of commixtion was invented by chance; for there were graffed two boughs of Orenge trees, one brought forth a sweet, and the other a sharp fruit. When occasion served to transplant and remove the Tree, it was cut off in the middle, according as Husband-men are wont to do when they plant such Trees after they are grown old; and by great chance, it was cut off there where the two boughs had been before engraffed: and so when the stock budded afresh, there arose one bud out of the sharp and sweet branches both together as they were left in the stock; and this one bud brought forth Apples or fruit of both relishes. Wherefore no question but such a thing may be effected by art, as well as it was by chance, if any man have a minde to produce such kind of fruits.

CHAP. V.

Of a third way, whereby divers kinds of fruits may be compounded together.

WE will also set down a third way, whereby we may mingle and compound divers kinds of fruits together. A way which hath been delivered unto us by the Ancients, though for my own part I think it to be not onely a very hard, but even an impossible matter. Notwithstanding, because grave Ancient Writers have set it down, I cannot scorn here to rehearse it: and though I have put it in practice, but to no purpose, for it hath not so fallen out as they write, yet I will not discourage any man that hath a mind to make trial hereof; for it may be that fortune will second their endeavours better then she did mine. The way is this; to gather many seeds of sundry Trees and fruits, and wrapping them up together, so to sow them: and when they are grown up into stalks, to bind all the stalks together, that they may not flie asunder, but rather grow up all into one Tree; and this Tree will bring forth divers kinds of fruits, yea and one and the same fruit will be mingled and compounded of many. It should seem that the Authors of this experiment, learned it first out of *Theophrastus*, who writes, that, If you sow two divers seeds neer together within a hands breadth, and then sow two other divers seeds a little above them, the roots which will come of all these seeds will lovingly embrace and winde about each other, and so grow up into one stalk or stock, and be incorporated one into another. But special care must be had how the seeds be placed; for they must be set with the little end upward, because the bud cometh not out of the low and hollow parts, but out of the highest. And there are four seeds required, because so many will easily and fitly close together. A matter, which if it were true, it might be a very ready means which would produce exceeding many and wonderful experiments. By such a means

Berries that are party-coloured may be produced.

If you take a great many berries, white, and black, and red, one amongst another, and sow them in the earth together; and when they are shot up, bind all their stalks into one, they will grow together, and yeeld party coloured berries. *Pliny* writes, that this way was devised from the birds; Nature, saith he, hath taught how to graffe with a seed: for hungry birds have devoured seeds, and having moistened and warmed them in their bellies, a little after have dunged in the forky twistes of Trees, and together with their dung excluded the seed whole which erst they had swallowed: and sometimes it brings forth there where they dung it, and sometimes the wind carries it away into some chinks of the barks of Trees, and there it brings forth. This is the reason why many times we see a Cherry-tree growing in a Willow,

ow, a Plane-tree in a Bay-tree, and a Bay in a Cherry-tree; and withal, that the berries of them have been party-coloured. They write also, that the Jack-daw hiding certain seeds in some secret chinks or holes, did give occasion of this Invention. By this self-same means we may produce

A Fig that is partly white and partly red.

Leon'ius attempts the doing of this, by taking the kernels or stones that are in a Fig somewhat inclinable to this variety, and wrapping them up together in a linnen cloth, and then sowing them, and when need requires, removing them into another place. If we would have

An Orenge or Citron-tree bear divers Apples of divers relishes;

Pontanus our Country-man, in his work of Gardening, hath elegantly taught us how to do it. We must take sundry seeds of them, and put them into a pitcher, and there let them grow up: and when they come forth, bind the sprigs together, and by this means they will grow up into one stock, and shrowd themselves all under one bark: but you must take heed that the wind come not at them to blow them asunder, but cover them over with some wax, that they may stick fast together; and let them be well plaistered with morter about the bark: and so shall you gather from them in time very strange Apples of sundry relishes. Likewise we may procure

A Damosin, and an Orenge or Limon to be mixt together.

In our books of Husbandry, we shewed at large, by many reasons alledged to and fro, that sundry seeds could not possibly grow into one; but all that is written in favour of this practice, is utterly false, and altogether unpossible. But this experiment we our selves have proved, whereby divers kinds of Damosins are mixt together. While the Damosin-trees were very tender and dainty, we fastened two of them together, which were planted neer to each other, as Sailers plat and tie their Cables: but first we pared off the bark to the inmost skin, in that place where they should touch together, that so one living thing might the more easily grow to the other: then we bound them up gently with thin lists, made of the inner bark of Elm, or such like stuff that is soft and pliable for such a purpose, lest they should be parted and grow asunder; and if any part of them were so limber that it would not stick fast, we wedged it in with splents; yet not too hard, for fear of spoiling it. Then we rid away the earth from the upper roots, and covered them with muck, and watered them often, that by this cherishing and tilling on, they might grow up the better: and thus after a few years that they were grown together into one tree, we cut off the tops of them about that place where they most seemed to be knit together; and about those tops there sprung up many buds; whereof, those which we perceived had grown out of both Trees, we suffered to grow still, and the rest we cut away; and by this means we produced such kind of fruit as we speak of, very goodly, and much commended. And concerning Limons, I have seen some in the Noble-mens Gardens of Naples, which, partly by continual watering at seasonable times, and partly by reason of the tendernesse and the ranknesse of the boughs, did so cling and grow together, that they became one tree; and this one Tree brought forth fruit compounded of either kind. We may also effect this featly by earthen vessels; for the plants that are set therein, we may very conveniently cherish up with continual watering, and perform other services towards them which are necessary for their growth. And as it may be done by Limons, so we have seen the same experiment practised upon Mulberry-trees, which growing in moist and shadowed places, as soon as their boughs closed one with another, presently they grew into one, and brought forth berries of sundry colours. If we would procure that

A Lettice should grow, having in it Parsley, and Rotchet, and Basil-gentle,

or any such like commixtion, we must take the dung of a Sheep or a Goat; and though

though it be but a small substance, yet you must make a shift to bore the Truttle through the middle, and as well as you can, get out the inmost pith, and in stead thereof put into it those seeds which you desire to have mingled together, packing them in as hard as the Truttle will bear it: and when you have so done, lay it in the ground about two handful deep, with dung and hollow geer, both under it, and round about it; then cover it with a little thin earth, and water it a little and a little; and when the seeds also are sprung forth, you must still apply them with water and dung; and after they are grown up into a stalk, you must be more diligent about them; and by this means at length there will arise a Lettice, mixed and compounded with all those seeds. *Palladius* prescribes the same more precisely. If you take, saith he, a Truttle of Goats dung, and bore it through, and make it hollow cunningly with a bodkin, and then fill it up with the seed of Lettice, Cresses, Basil, Rotchet, and Radish, and when you have so done, lap them up in more of the same dung, and bury them in a little trench of such ground as is fruitful and well manured for such a purpose, the Radish will grow downward into a Root, the other seeds will grow upward into a stalk, and the Lettice will contain them all, yeelding the several relish of every one of them. Others effect this experiment on this manner. They pluck off the Lettice leaves that grow next to the root, and make holes in the thickest substance and veins thereof, one hole being a reasonable distance from the other; wherein they put the forenamed seeds, all but the Radish seed, and cover them about with dung, and then lay them under the ground, whereby the Lettice grows up, garded with the stalks of so many herbs as there were seeds put into the leaves. If you would procure

Party-coloured flowers to grow;

you may effect it by the same ground and principle. You must take the seeds of divers kinds of flowers; and when you have bound them up in a Linen cloth, set them in the ground, and by the commixtion of those seeds together, you shall have flowers that are party-coloured. By this means, it is thought that Daisies of divers kinds were first brought forth, such as are to be seen with golden leaves, reddish about the edge; nay some of them are so meddled with divers colours, that they resemble little shreds of silk patcht together.

CHAP. VI.

How a double fruit may be made, whereof the one is contained within the other.

There is also another way of Composition, whereby fruits may be so meddled together, not as we shewed before, that one part of it should be of one fruit, and the other part of another kinde; nor yet that one and the same bough shall at once bear two or three several kinds of fruits; but that one and the same fruit shall be double, containing in it self two several kinds, as if they were but one; whereof I my self have first made trial. But let us see how the Ancients have effected this: and first

How to make an Olive-grape.

Diophanes sheweth that the Olive being engraffed into the Vine, brings forth a fruit called Elæo-staphylon, that is to say, an Olive-grape. But *Florentinus* in the eleventh book of his Georgicks, hath shewed the manner how to engraffe the Olive into a Vine, that so it shall bring forth not only bunches or clusters of grapes, but an Olive fruit also. We must bore a hole through the Vine neer to the ground, and put into it the branch of an Olive-tree, that so it may draw and receive both from the Vine, sweetnesse; and also from the ground, natural juice and moisture, whereby it may be nourished: for so will the fruit taste pleasantly. And moreover, if, while the Vine hath not yet born fruit, you take the fruitful sprigs thereof, and plant them elsewhere, these sprigs will retain the mixture and composition of the

Vine and the Olive-tree together, and bring forth one fruit that shall have in it both kinds, which therefore is called by a name compounded of both their names, Eleo-staphylus, an Olive-grape. He reports that he saw such a tree in the Orchard of *Marius Maximus*; and tasting the fruit thereof, he thought with himself that he felt the relish of an Olive-berrie and a grape kernel both together. He writes also that such plants grow in Africa, and are there called by a proper name in their Country language Ubolima. But we must set props under them, to bear up the weight and burden of the boughs: though if we engraffe them any other way but this, we shall need no polls at all. I suppose also that by this self-same means it may be effected,

That a Grape should have Myrtle in it.

Tarentinus writes, that the Vine may be engraffed into the Myrtle-tree, and the Vine-branches thereon engraffed, will bring forth grapes that have Myrtle-berries growing underneath them. But the manner of this engraffing he hath not set down. If you engraffe the Vine-branches in the higher boughs or arms of the Mrytle, then they will bring forth grapes after their ordinary manner, not having any Myrtle in them: but if you engraffe them as she shewed before, neer to the ground, as the Olive-tree must be into the Vine, then you may produce Myrtle-grapes, though not without some difficulty. We may likewise produce

Damosins that shall be of the colour of Nuts;

for such kind of fruit were produced by the Ancients, and called Nucipruna, that is, Nut-Damosins, as *Pliny* reporteth. It is a peculiar property of these fruits that are engraffed into Nut-trees, that they are in colour like to their own kinde, but in taste like unto Nuts; being therefore called by a mixt name, Nuci-pruna. So there may be produced, as the same *Pliny* writes,

Damosins that have sweet Almonds within them.

There is, saith he, in this kind of fruit an Almond-kernel, neither can there be any prettier double fruit devised. The same *Pliny* reports also, that there is a kind of

Damosin that hath in it the substance of an Apple,

which of late was called by the Spaniards Malina, which cometh of a Damosin engraffed into an Apple-tree. There is also a kind of fruit called by the Apothecaries Sebesten, or

Mixa, which hath in it a sweet Almond.

This same Mixa is a kind of Damosin, which differs from all others; for whereas others have a bitter Almond or kernel within their stone, this only hath a sweet kernel. It is a plant peculiar to Syria and Egypt, though in *Plinies* time it was common in Italy, and was engraffed in the Service-tree, whereby the kernel was the pleasanter. They engraffed it into the Service-tree, likely for this cause, that whereas the fruit of it self would make a man laxative, the sharp taste of the Service being mixed with it, might cause it to be more binding. But now we will shew

How to produce an Almond-peach, which outwardly is a Peach, but within hath an Almond-kernel.

The former means producing double fruits, which the Ancients have recorded, are but vain fables; not only false matters, but indeed impossible to be so done: for, we shewed in the book of Husbandry, if you engraffe the Vine into the Myrtle, there will be no such fruit brought forth after that manner. Besides, it is impossible to engraffe the Olive-tree into the Vine; or if it were engraffed, yet would

would it not bring forth any such grapes. *Pliny* speaks of Apple-damosins, and Nut-damosins; but he sheweth not the manner how they may be produced; happily, because it was never seen nor known. But we will demonstrate the manner of it to the whole world, by this example: this fruit is called an Almond-Peach by the late Writers, because it bears in it self the nature, both of the Almond and the Peach compounded together. And it is a new kind of Adultery or commixtion, wrought by skill and diligence used in graffing; such a fruit as was never heard of in former ages, partaking both of the shape, and also of the qualities of either parent: outwardly it resembles the Peach both in shape and colour; but inwardly it hath a sweet Almond within the kernel, that both looks and tastes like an Almond; and so is the Tree also a middle betwixt the Almond-tree and the Peach-tree, outwardly like the Peach-tree, and inwardly like the Almond-tree. The manner of engraffing is, by clapping the bud of one upon the bud of another; either upon one of the trees that bare one of the buds, or else setting them both into a third tree, as we have done when the Trees have been old. We may also go farther, and upon that branch wherein those two buds grow up together, we may set a third bud, and so the fruit will be threefold. These trees we had growing in our own Orchards many years together. By this self-same means we may produce a very strange Apple; the wonderfulnesse whereof will ravish our senses and our thoughts; namely

A Citron that hath a Limon in the inner parts:

and this, I say, we may produce by laying the bud of a Citron upon the bud of a Limon. And the most of those kinds are to be found among the Brutii, a people dwelling neer Naples, and the Surrentines in Campania; and these fruits proceed from the tart juice that is within the branch. In like manner

A double Orenge may be produced;

which kind of fruit is common with us, wherein are double ranks of kernels in such rare proportion, that you would wonder and be amazed to see.

CHAP. VII.

Of another device, whereby strange fruits may be generated, and made either better or worse.

CONcerning the praises and excellency of engraffing, we have spoken elsewhere more at large: Here it shall suffice onely to shew, that by engraffing, new fruits may be produced, some better, and some worse then their ordinary kinds. We will relate some experiments of our own, and some which the Antients have found out. And first

How to produce a Chest-nut of the best.

There is one rare example hereof not to be omitted. *Corellius*, a Noble-man of Rome, born at the City Ateste, engraffed a Chest-nut upon a Chest-nut branch, in the Country of Naples, and so produced a Chest-nut called Corelliana, after his name. After that, his Heir, whom he made a Free-man, graffed the same Corelliana upon another Tree: the difference betwixt them both is this, that the former is a larger Chest-nut, but this latter is a better fruit. These things have been done by the Ancients: and the good that cometh by engraffing is such, as that if any thing be engraffed into a stock or branch of its own kind, the fruit will thereby be made better. The Cherry-tree is very kindly to be engraffed: and you shall scarce ever have a good and a sweet Cherry, unlesse it be by engraffing upon some other Tree, as *Pamphilus* reporteth. By the president of this example, we have endeavoured to change

The Barbery-Tree into the Tree called Tuber:

for I take it, that the Oxyacantha, or the Barbery-tree, is nothing else but a bastard,

or

or a wild Tuber: and therefore if a man follow that example of *Corellius*, and engraffe the Oxyacantha oftentimes into the own branch or stock, it will be much bettered, and become the Tuber-tree: as also on the other side, the Tuber-tree, if it be not dressed and looked unto, doth degenerate into the Barbery-tree. I my self have engraffed it three or four times into the branches of its own kind, in my own Orchard; and if I live so long, I will still engraffe it so, till it do bring forth Tubers; for I find that it brings forth already, both greater and sweeter berries. Now we will speak of such fruits, as are engraffed not into their own branches, but into branches of another kind, which contain in them both the fashion and the properties of either kind: and we will teach the manner how to compound a new kind of fruit lately devised, namely

A Peach-nut, mixed of a Nut and a Peach.

There is a kind of Peach called a Peach-nut, which the Ancients never knew of, but hath lately been produced by pains taken in graffing, as I my self have seen. It bears the name and the form also of both the parents whereof it is generated, having a green colour like a Nut, and hath no mossie down on the out-side, but very smooth all over; the taste of it is sharp and somewhat bitter; it is long ere it be ripe, and is of a hard substance like a Peach. That part of it which lies against the Sun is reddish; it smells very well; it hath within, a rough stone, and hard like a Peach-stone; it hath a pleasant relish; but the apple will not last so long as the Nut, or kernel within. Which kind of fruit cannot be supposed to have been otherwise brought forth then by divers engraffings of the Peach into the Nut-tree, one year after another. We may also better the fruits by engraffing them into better Trees. *Diophanes* produced

Citron-apples compounded of an Apple and a Citron.

for he engraffed an Apple into the Citron-tree, and that oftentimes; but it withered as soon as ever it did shoot forth: howbeit, at length it took fast hold, and became a Citron-apple-tree. *Anatolius* and *Diophanes* made a compound fruit called

Melimela, of an Apple and a Quince mixt together;

for if we engraffe an Apple into a Quince-tree, the Tree will yield a very goodly apple, which the Athenians call Melimelum, but we call it a St. *Johns* Apple. *Pliny* writes, that an ordinary Quince, and a Quince-pear being compounded,

Produce a fruit called Milviana.

The Quince, saith he, being engraffed into a Quince-pear, yieldeth a kind of fruit called Milvianum, which alone of all other Quinces is to be eaten raw. Now as we have shewed how to make fruits better by engraffing, both for shew and for properties, we will declare also, how by engraffing

Fruits may be made worse.

We will shew it first by a Pear. *Marcus Varro* saith, that if you engraffe a very good Pear into a wilde Pear-tree, it will not taste so well as that which is engraffed into an Orchard Pear-tree. If you engraffe a Peach into a Damosin-tree, the fruit of it will be much less: if into a bitter Almond-tree, the fruit will have a bitter relish. Likewise if you graffe a Chest-nut into a Willow, and be somewhat a latter fruit, the taste of it will be more bitter. And so if you graffe an apple into a Damosin-tree, the fruit which it yields, will neither be so great, nor yet so good, as it is in the own kind.

Chap. VIII.

How to procure ripe fruis and flowers before their ordinary season.

Art being as it were Natures Ape, even in her imitation of Nature, effecteth greater matters then Nature doth. Hence it is that a Magician being furnished with Art, as it were another Nature, searching throughly into those

works which Nature doth accomplish by many secret means and close operations, doth work upon Nature, and partly by that which he sees, and partly by that which he conjects and gathers from thence, takes his sundry advantages of Natures instruments, and thereby either hastens or hinders her work, making things ripe before or after their natural season, and so indeed makes Nature to be his instrument. He knows that fruits, and flowers, and all other growing things that the world affords, are produced by the circuit and motion of celestial bodies; and therefore when he is disposed to hinder the ripening of any thing, or else to help it forward, that it may be more rare and of better worth, he effects it by counterfeiting the times and seasons of the year, making the Winter to be as the Summer, and the Spring-time as the Winter. Amongst other means, engraffing is not a little helpful hereunto. Wherefore let us see, how we may by engraffing

Produce Grapes in the Spring-time.

If we see a Cherry-tree bring forth her fruit in the Spring-time, and we desire to have Grapes about that time, there is fit oportunity of attaining our desire, as *Tarentinus* writeth. If you engraffe a black Vine into the Cherry-tree, you shall have Grapes growing in the Spring-time: for the Tree will bring forth Grapes the very same season, wherein it would bring forth her own fruit. But this engraffing cannot be without boring a hole into the stock, as *Didymus* sheweth. You must bore the Cherry-tree stock through with a wimble, and, your Vine growing by it, you must take one of the next and goodliest branches thereof, and put it into the auger-hole; but you must not cut it off from the Vine, but place it in as it grows: for so the branch will live the better, both as being nourished by his own mother the Vine, and also as being made partaker of the juice of that Tree into which it is engraffed. This sprig within the compasse of two years, will grow and be incorporated into the Cherry-tree: about which time, after the skar is grown over again, you must cut off the branch from the Vine, and saw off the stock of the Cherry-tree wherein it is engraffed, all above the boring place, and let the Vine-branch grow up in the rest: for so shall neither the Vine be idle, but still bring forth her own fruit, and that branch also which was engraffed doth grow up together with it, being nothing hurt by that engraffing. We may also by the help of engraffing procure

A Rose to shew forth her buds before her time.

If we pluck off a Rose-bud from the mother, and engraff by such an emplastering as we spake of before, the same into the open bark of an Almond-tree, at such time, as the Almond-tree doth bud, the Rose so engraffed, will bring forth her own flowers out of the Almond bark. But because it is a very hard matter to engraffe into an Herbe, and therefore we can hardly produce flowers sooner then their time by that means, we will shew another means hereof; And namely,

How Cucumbers may hasten their fruits.

Columella found in *Dolus Mendesius* an Ægyptian, an easie way whereby this may be done. You must set in your Garden in some shadowy place well dunged, a rank of Fenel, and a rank of Brambles one within another; and after the æquinoctial day, cut them off a little within the ground; and having first loosed the pith of either of them with a wooden puncheon, to convey dung into them, and withal to engraffe in them Cucumber-seeds, which may grow up together with the Fenel and the Brambles: for by this means the seeds will receive nourishment from the root of the stalk into which they are engraffed, and so you shall have Cucumbers very soon. But now let us shew how we may accomplish this thing by counterfeiting as it were the seasons of the year: and first, how we may procure that

Cucum-

Cucumbers shall be ripe very timely.

The Quintiles say you must take panniers or earthen pots, and put into them some fine sifted earth mixed with dung, that it may be somewhat liquid, and preventing the ordinary season, you must plant therein Cucumber seeds about the beginning of the Spring, and when the Sun shines, or that there is any heat or rain, they bring the panniers forth into the Air, and about Sun-setting they bring them into a close house; and this they do daily, still watering them as occasion serveth. But after that the cold and the frost is ceased, and the Air is more temperate, they take their panniers and digge a place for them in some well-tilled ground, and there set them, so that the brims thereof may be even with the earth; and then look well to them, and you shall have your desire. The like may be done by Gourds. *Theophrastus* sheweth, that if a man sow Cucumber seeds in the Winter-time, and water them with warm water, and lay them in the Sunne, or else by the fire, and when seed-time cometh, put whole panniers of them into the ground, they will yield very timely Cucumbers, long before their ordinary season is to grow. *Columella* saith, that *Tiberius* the Emperour took great delight in the Cucumbers that were thus ripened, which he had at all times of the year; for his Gardners every day drew forth their hanging Gardens into the Sun upon wheels, and when any great cold or rain came, they straightwayes carried them in again into their close hovels made for the same purpose. *Didymus* sheweth

Roses may bud forth, even before Winter be past,

if they be used after the like manner; namely, if you set them in hampers or earthen vessels, and carefully look unto them, and use them as you would use Gourds and Cucumbers, to make them ripe before their ordinary season. *Pliny* sheweth

How to make Figs that were of last years growth, to be ripe very soon the next year after;

and this is by keeping them from the cold too, but yet the device and practice is not all one with the former. There are, saith he, in certain Countries, as in Mæsia, Winter Fig-trees, (a small tree it is, and such as is more beholding to Art then to Nature) which they use on this manner. After the Autumn or Fall, they lay them in the earth, and cover them all over with muck, and the green Figs that grew upon them in the beginning of Winter are also buried upon the Tree with them. Now when the Winter is past, and the Air is somewhat calmer the year following, they dig up the Trees again with the fruit upon them; which presently do embrace the heat of a new Sun as it were, and grow up by the temperature of another year, as kindly as if they had then new sprung up: whereby it cometh to passe, that though the Country be very cold, yet there they have ripe Figs of two years growth as it were, even before other Fig-trees can so much as blossom. But because we cannot so well practise these experiments in the broad and open fields, either by hindering, or by helping the temperature of the Air, therefore we will assay to ripen fruit and flowers before their time, by laying warm cherishers, as lime, or chalk, and nitre, and warm water, to the roots of Trees and herbs. If you would have

A Cherry ripe before his time,

Pliny saith, that you must lay chalk or lime to the root of the Tree before it begin to blossom; or else you must oftentimes pour hot water upon the root; and by either of these means you may procure the ripening of Cherries before their time: howbeit afterward the Trees will be drie and wither away. If you would procure the ripening

Of a Rose before his time;

Dydimus saith you may effect it by covering the Rose-bush with earth, a foot above the root of it, and there pour in wam water upon it, whilst the slippe

 beginneth

beginneth to shoot up, and before any blossom appeareth. Likewise if you would have

A Vine to bring forth before her time,

you must take nitre, and pown it, and mix it with water, so that it be made of the thicknesse of hony; and as soon as you have pruned the Vine, lay good store of your nitre upon the Vine-buds, and so shall your buds shoot forth within nine days after. But to procure the Grapes to be timely ripe, you must take the mother of the wine before it is become sowre, and lay the same upon the root of the plants when you set them; for at that time it is best so to use them, as *Tarentinus* and *Florentinus* both affirm. Moreover, if you would have any thing to bud forth very timely, *Theophrastus* saith you may procure it by setting the same

Into the Sea-onion:

for if a Fig-tree be set but neer it, it will cause the speedy ripening of Figs. And to be brief, there is nothing set in the Sea-onion, but will more easily and speedily shoot forth, by reason of the strong inward heat which that herb is endued withal. *Democritus* sheweth another means, whereby you may cause

The Fig tree to bring forth hasty Figs,

namely, by applying the same with pepper, and oyle, and Pigeons dung. *Florentinus* would have the dung and the oyle to be laid upon the Figs when they be raw and green. *Palladius* counselleth, that when the Figs begin to wax somewhat red, you should then besmear them with the juice of a long Onion mixed with pepper and oyle; and so the Figs will be the sooner ripened. Our practice is this; when the Figs begin to wax ripe, we take a wooden needle, and anoint it over with oyle, and so thrust it through both ends of the Figs; whereby in few dayes the fruit is ripened. Others effect this, by heaping up a great many Rams horns about the root of the Tree. *Pliny* shews

How to make Coleworts branch before their time;

and this is by laying good store of Sea-grasse about it, held up with little props; or else by laying upon it black nitre, as much as you can take up with three fingers, or thereabouts; for this will hasten the ripening thereof. We may also cause

Parsley to come up before his time.

Pliny saith, that if you sprinkle hot water upon it, as it begins to grow, it will shoot up very swiftly. And *Palladius* saith, that if you pour vineger upon it by little and little, it will grow up; or else if you cherish it with warm water as soon as ever it is sown. But the mind of man is so bold to enter into the very secret bowels of Nature, by the diligent search of experience, that it hath devised to bring forth

Parsley exceeding timely.

It grows up easily of it self; for within fifty or fourty daies it is wont to appear out of the earth, as *Theophrastus* and others affirm, as by their writings may be seen. Our Country-men call it Petroselinum. In the practising of this experiment, you must shew your self a painful workman; for if you fail, or commit never so small an error herein, you will misse of your purpose. You must take Parsley seeds that are not fully one year old, & in the beginning of Summer you must dip them in the vineger, suffering them to lie a while in some warm place: then wrap up the seeds in some small loose earth, which for this purpose you have before meddled with the ashes of burned bean-straw: there you must bedew them oftentimes with a little warm water, and cover them with some cloth, that the heat get not from them; so will they in short time appear out of the earth: then remove the cloth away, and water them still, and thereby the stalk will grow up in length, to the great admiration of the beholders. But in any case, you must be painful and very diligent; for I have

assayed

assayed it; and by reason of some error and negligence, I obtained not my desire: howbeit, many of my friends having made diligent trial hereof, found it to be a very true experiment. Likewise may

Lentiles be hastened in their growth,

if they be smeared over with dry Ox-dung, a little before they are sown; but they had need lie in that dung four or five daies before they be cast into the ground. So

Melons may be hastened in their fruit;

for if in the Winter-time you lay a parcel of earth in mixens that are made of hot dung, and in the same earth sow Melon-seeds, the heat of the dung will cause them soon to sprout forth: you must keep them warm with some covering, from the snow, and the cold of the night; and afterward when the Air is more calm, you must plant them in some other place: for by this means we have hastened the fruit hereof. And by this same device of preventing their seed-time, we may cause

Cucumbers to hasten their fruit.

But *Theophrastus* setteth down another practice. Cucumber-roots, if they be carefully lookt into, will live long. Therefore if a man cut off a Cucumber close by the ground, after it hath brought forth fruit, and then cover the roots over with earth, the very same roots the year following will bring forth very timely fruit, even before others that were most seasonably sown. *Theophrastus* also sets down another way

Of hastening Cucumbers,

and that is by macerating the seed before it be sown; or else by supplying it with continual moisture after it is sown. So also we may procure

Pease or Vitches to be timely ripe;

If we sow them before their ordinary season in Barley time, as *Florentinus* sheweth. But *Theophrastus* saith this may be done by macerating them in the water before seed-time, but especially if you macerate them shales and all: for there is but a little of it will turn to putrefaction; and the shale feeds the kernel well at the first, howsoever afterward it turn to nothing. The same *Theophrastus* sheweth also

How the Rape-root may be hastened in growth.

If the Gardner, saith he, do hide the same in an heap of earth, it will cause it to bring forth very timely fruit the year following. There may other fruits also be timely ripened; as

A Quince may be hastened in ripening,

if you daily bedew them with continual moisture, as *Palladius* sheweth. And *Democritus* saith, you may have

Roses growing in the moneth of January,

if you water the slip twice a day in the Summer-time. We may likewise procure that

Gourds shall bring forth very timely,

by underpropping and holding up their young tender sprigs. In like manner we may cause

The forward Fig-tree to hasten her fruit,

by renting or scarifying the body of the Tree, that the milky juice may there swell and find issue out of it, that when the superfluous humor is gone forth, that which is left

left behind, may be the more easily concocted, and so the fruit will be sooner ripened. To be short, we may procure

The timely ripening of all kind of fruit.

If we sow or plant them in some place where they may lie still opposite against the Sun, or if we put them into certain vessels made for the same purpose, and still water them with warm water, and let them lie continually in the Sun. And if we would have them to hasten their fruit very speedily, we should have an Oven made under those vessels, that so by reason of a double warmth, one from above, and the other from beneath the fruit may more speedily be produced. And surely this is the only cause, why fruits and flowers are more forward and sooner ripe in the Country Puteoli, and the Island Inarime, then in all other places of Campania, because there they hasten the concoction and ripening of them, by cherishing the roots thereof with fire and heat within the earth.

CHAP. IX.

How we may have fruits and flowers at all times of the year.

BY these wayes of procuring fruit to be timely ripe, it may be effected, that we shall have fruits and flowers at all times of the year, some very forward that come before their ordinary season, and some late-ward that come after: as for their own time, then, Nature of her self affords them unto us. *Aristotle* in his Problems sheweth

How we may have Cucumbers all the year long,

both in season and out of season. When they are ripe, saith he, you must put them into a waterish ditch, neer the place where they grew, and cover it over: for by this means the heat of the Sun cannot come at them to dry them, and the waterishnesse of the place will keep them supple and moist, so that they will still be fresh and green. And *Theophrastus* after him saith the like; that Gourds and Cucumbers must be taken when they are small, and in their tender growth, and must be hidden in some ditch, where the Sun cannot come to waste and consume their moisture, nor the wind to dry them, which two things would mar and hinder their growth, as we see it falleth out in Trees, that are so situate, as both the winde and the Sun have their full scope upon them. If you would have

Citron-trees bear fruit all the year;

to have Citrons still growing fresh upon the Tree, you must observe that manner and custom which was first peculiar in Assyria, but is now usual in many places. When their season is to be gathered, you must cut off some of the fruit from the Tree, and prune those parts well where you have left no fruit; but you must leave some behinde, upon some other parts of the Tree: so shall you find a new supply of fresh fruit there where you cut off the former; and when these be ripe, then cut off those which you left upon the Tree before, and so fresh fruit also will come up in their stead. *Pontanus* hath set down the same experiment in verse; that part of the fruit is to be gathered, and the rest left hanging upon the Tree; for so it will come to passe, that the Tree will bud forth afresh in those parts where it finds it self destitute of fruit, grieving as it were that one bough should be beautified with fruit, and the other should have none at all. We may also effect this by the help of engraffing: for if we desire

To have Apples all the year,

Dydimus in his Georgicks saith, that if we engraffe an Apple into a Citron-tree, it will bring forth for the most part continual fruit. And if we would have

Arti-

Artichockes grow continually,

we may learn to do it out of *Cassianus*, who following the Authority of *Varro*, saith, that Artichocks always bring forth fruit about the same season that they are set in, and therefore it is easie to have them all the year long. The ordinary season of planting Artichocks is in November & September, and commonly they bear fruit in July and August: but they will bring forth also in March and April, if they be planted accordingly; for by that time they will have as perfect a soul, as at any time else. If you practise it three years together, to plant them in the moneths of November, December, January, February, and March, you shall have Artichockes of that kind, as will bring forth fresh fruit almost all the year long. Likewise, if you desire to have

Sperage alwayes growing fresh,

and fit to be eaten, you must take this course: as soon as you have gathered the fruit, you must dig round about the roots as they lie in their own place under the earth, and by this means they will shoot up into new stalks. In like manner, if you desire to have

Roses growing all the year long,

you must plant them in every moneth some, and by dunging them, and taking good heed unto them, you shall have fresh Roses continually. By the like practice, you may also have

Lillies all the year long;

for if you take the roots or cloves of Lillies, and set them in the ground, some fourteen, some twelve, some eight fingers deep, you shall by this means have Lillies all the year long, and so many several flowers of them as you have planted several roots. And as this may be done by Lillies, so *Anatolius* thinks the same practice will take like effect in all other flowers. *Theophrastus* saith, that we may have

Violets alwayes growing,

if we set them in well-fenced places, and such as lie open to the force of the Sun: for commonly fruits and flowers will grow there, when they will grow no where else: but they must be very carefully lookt unto, and then they will come on the better. The best way is, to set them in earthen vessels, and keep them from vehement cold and heat, bringing them forth still when the Air is calm and temperate, and applying them with moisture, and muck, and carefull dressing. So we may procure also that

The Herbe Oenanthe shall flourish all the year;

for *Theophrastus* writes, that if we deal thereby, as in the procuring of Violets, we shall have flowers upon it continually.

Chap. X.

How to produce fruits that shall be later and backward.

We have already shewed how to produce forward fruits that will be very timely ripe; now it remaineth that we set down such cunning sleights and devices, as whereby we may procure fruit to grow very later, not to be ripe before the lowest of Winter. And this we may learn to effect by contrary causes to the former; and whereas we were to heat that which we would have to be timely ripe, we must here use coolers to make things ripen slowly; and whereas before we were to engraffe later fruits into forward Trees, here we must engraffe forward fruits into later Trees. Likewise we must sow or plant late, that we may receive later fruit: for as beasts

beasts that are long ere they be perfectly bred, are long before they have their hair, and do not change their hair before the same time of the year come again, in which they were brought forth; so also in plants it cometh to passe, that if they be set late, they will grow late, and bring forth backward fruits. To begin with engraffing, we will shew how thereby

To produce later Cherries.

There is a kind of Tree that brings forth a very bitter fruit, so bitter that it is called Amarendula, that is to say, a bitterling; a branch of this Tree being engraffed into a Cherry-tree, after three or four several engraffings will bring forth at length Cherries that will be very later: and howsoever the fruit of its own kind be very bitter, yet in time it will forget the former relish, and yeeld a more pleasant taste. We may effect this also by that kinde of engraffing which we spoke of in the eighth Chapter; but that will be longer in working. Likewise we may procure that

A Pear shall grow exceeding later,

if we engraffe the same into a Willow; for we have declared before, that such an engraffing there may be; and certain it is, that thereby a very latter fruit may be produced. But we must see that the Willow grow in such a place, as where it may be nourished with continual moisture; and this engraffing must be done about the last dayes of the Moons last quarter; and it must be graffed betwixt the Tree and the bark. If any man would have

Roses grow later;

Florentinus shews how it may effected. When you have engraffed the Vine-branch into a Cherry-tree, as soon as ever the fruit cometh forth, you must set the bud of a Rose into the bark or pill thereof: for growing in another body, look what time the Tree wherein it is set, will fructifie, and at the same time will the Rose open it self, yielding a very excellent savour, and besides will be very pleasant to behold. To be short, all kinds of fruits may be made to grow later, by this kind of engraffing. Now there is another way whereby we may procure the backward growth of fruits: and this is by shaking or plucking off the buds or blossoms that grow first upon the Tree; for while new buds are growing up in the room of the first, time wears away, and yet if the Air be seasonable, these latter buds will be good fruit, and well ripened, though they be slow. Thus we may produce

Figs that are very backward,

as *Columella* sheweth. When the green Figs are very small, shake them off, and the Tree will bring forth others that will not be ripe before the latter end of Winter. And *Pliny* following his authority, saith, that Figs will grow latter, if the first Green ones be shaken off when they are about the bignes of a bean; for then others will come up in their stead, which will be long a ripening. And by this means it is, that *Tarentinus* shews how to produce

Latter Grapes,

We must take away the bunches that grow first, and then others will grow up in their stead: but we must have an especiall care still to look to the Vine, that other clusters may grow, and at length be ripened. By this means likewise we may cause

Roses to open or blow very latter,

if we tuck off the buds that grow first, at such time as the flower begins to appear and shew forth it self. This practise will take best effect, if it be used upon musk-roses, especially such as are wont to be fullest of leaves; for thus we have in the Country store of Roses growing all the Winter long, as they stand in earthen vessels, and are set up in Windows. So if you would have

Clove-

Clove-gilliflowers blow later;

you must tuck off the first stalks and slips about that time as they are ready to bud, and set them in the heat of the Sun all the Summer long; but you must water them continually, that they lose not all their moisture: for by this practice we have procured other stalks, and other slips which have yeelded flowers all the Winter long even to the Spring, so that we have continual Winter-gilliflowers, both at home and in the Country abroad. There is also another device whereby we may cause fruit to ripen very late; not by shaking or cutting off the buds, but by planting them late, and keeping away the cold from them. As for example, If we would

Produce later Cucumbers,

because we know that this kind of fruit cannot endure any frost, or showers, or cold storms, therefore we must sow the seeds in the Summer-time; and when the Winter draws on, we must lay heaps of muck round about them, whereby no cold may come at them to destroy them, and they may be ripened through the heat and fatness thereof. But the best way to have later Cucumbers, is, as we shewed before, either to set thereof into great Fennel stalks, or else to cast the Cucumbers into a pit for a certain season. If we would have

A Rose blow in the Winter;

we must watch the time when the tops of the sets begin to shoot up, as they grow on their beds; and then take away the sets, and plant them in another place, where the root afterward wil take, & so yeeld us a winter-rose. Likewise if we desire to have

Straw-berries in the Winter or Spring,

as we have in the Summer, we must take them whiles they are white, before they are grown to their reddish hiew, and put them leaves and all into reeds or canes, stopping up the mouth thereof with some fat soil, and burying them in the earth till Winter come; and then if we would have them to be red of their own natural colour, let them lie a while in the Sun, and we shall obtain our purpose. By the like device as this is, we may reserve

Lettice for a Winter sallet.

When she hath brought forth her leaves, that they grow up round together, you must bind the tops of them about with a little string, and keep them growing in an earthen vessel, in such a place as they may alwayes receive fit nourishment; and by this means you shall have them still white and tender. In like manner

Endive may be kept till Winter,

to have it still fresh for any use. Others take other courses that are less chargeable; as to cover them only with earth, or with straw and leaves. Gardeners with us cover them in their Gardens with sand or such like earth, whereby they keep them very white and tender, and yet enjoy them all the Winter long.

Chap. XI.

How we may cause fruit to grow bigger then their ordinary kinde.

It remaineth now that we set down certain rules and wayes whereby fruit may be made greater, and far exceed the ordinary bigness of their own kind: and this may be effected divers wayes; for it may be done either by engraffing only (for indeed this is the chief priviledge that engraffing hath, to procure bigger fruit); or else by planting upon those Trees which bring forth greater fruit of their own kind; or else by gathering of the fruit here and there some, if the Tree be overladen, that so the juice may more plentifully bestow it self upon the fruit that is left behind; or else by dressing and trimming them; or by other devices, as hereafter shall be shewed. We will first begin with engraffing, and shew how we may procure thereby

That Apples or other like fruit shall grow bigger then they are wont.

A tree that is planted with a graffe of her own kinde, will alwayes bring forth greater fruit, then if it were not so planted. We brought an example hereof out of *Pliny*, that *Corellius* took a Scion of a Chestnut-tree, and engraffed the same into the tree again, and thereby produced a greater and a better Chestnut. And for my own part, I have oft-times made the like proof in many other fruits, and by experience have found that all fruits may be made greater by engraffing, and carefu looking unto, but especially Citrons. Secondly, we may procure fruits to be greater then ordinary, by graffing upon another Tree, whose kind is to bear bigger fruit. As for example, if we would produce

Pears that should be greater then ordinary,

especially the least sort of Pears called Myrapia, or Musk-pears, we may effect it by engraffing them into a Quince-tree; because the Quince-tree, of all other, bears the greatest fruit: and thereby the least Pears that are may be so augmented, that they will become a very goodly fruit; experience whereof, we have in many places in our Country. So we may cause

The Medlar-tree to bear huge Medlars,

greater then any man would imagine, if we engraff it into the Quince-tree: the proof whereof both I have made my self, and seen it tried by many others; and the oftener we so engraff it, the greater Medlars we shall procure. Likewise

The small Apricock may be made greater,

whereas they are the smallest kinde of Peaches that are. I have oftentimes engraffed it upon that kinde of Damosin-tree which bears a Plum like a Goats stone both in shape and greatness, (it may be it is our Scag-tree) and by this means I procured great Apricocks: but if you ingraff it into any other Damosin-tree, it will yeeld but a bastard-fruit: for the Apricock doth not endure kindly, to be engraffed into any other trees besides. In our Naples and Surrentine orchards, there is excellent fruit of this kinde; and I never saw any elsewhere. We may also

augment the fruit of the Myrtle-tree.

The Pomegranate-tree and the Myrtle-tree are each delighted with others company, as *Didymus* writeth in his Georgicks; where he saith plainly, that the Pomegranate-tree being engraffed into the Myrtle-tree, and likewise the Myrtle-tree into the Pomegranate-tree, do each of them bring forth a greater fruit. But I am perswaded that the Myrtle-tree brings forth greater fruit in proportion to her body when it is engraffed upon the Pomegranate-tree, because the kinde of this is greater then the kinde of that, then the Pomegranate-tree doth when it is engraffed upon the Myrtle-tree. By such a kinde of means we may also procure

Mulberries greater then ordinary,

if we engraff a Mulberry into a Fig-tree: for so *Palladius* hath written, That if the Mulberry be engraffed into a Fig-tree, the Fig-tree will cause it to change his colour, and will fill up the fruit thereof with a fat juyce, so that they shall be greater Mulberries then ordinarily their kinde is wont to yeeld. A third means whereby Apples or such-like fruit may be augmented, is, by plucking off some of the fruit here and there, and leaving some few upon the trees: for so shall the juyce of the tree bestow it self more liberally upon the fruit that is left, and make it greater: as a mother doth more bountifully feed one childe with her milk, then she can feed twain. Wherefore if we would procure

Citrons greater then their kinde,

Florentinus counselleth us, that when the fruit beginneth to weigh down the boughs, we should pluck off here and there some, and leave but a few behinde; so shall they that are left be thicker and bigger every way. *Pontanus* also saith the same. If, saith he, you would have great Citrons, big enough to fill your hand, you must shake off a great many from all the boughs, onely leaving some few, (but you must leave both the greatest, and those also that grow in the chiefest and likeliest parts of the tree:) for, saith he, the heir which is left, will make himself merry and fat with his brothers milk, and thrive much the better. *Palladius* shews

How to make Apples greater then ordinary,

and it is by this same means. For when they hang thick upon the boughs, you must gather away the worst, that so the nourishing juyce may be converted to the best, and the fairest may thereby be the better augmented. There is yet another means whereby we may cause fruit to be the greater; and this by dressing and trimming, when we dig about them, and water them, and lay muck about them. And first, by this means

Citrons may be made greater:

for, as *Palladius* saith, they are much holpen and delighted with continual digging about them. And

Quince-pears may be augmented,

as the same Author sheweth, by watering them continually. And

Peaches may be augmented much,

if we plant them in moist places, and supply them with continual watering. But if you would have the Peach-trees

Bring forth very great ones,

you must watch the time when they blossom, and suckle them three days together with three pintes of Goats milk, as *Palladius* sheweth. We have practised to cause

The Pomegranate-tree to bear a mighty fruit;

and that by this means. We took a good portion of fat muck, whereunto we put an equal portion of Swines dung, and the lees of Wine and Barley-bran; and we kept all this in a dry place for a year together, every month manging them again one with another; and at last we put Vineger to it, and made it like an Ointment. Afterward in October and November, we digged away the earth from about some parts of the Pomegranate-tree-roots, and there wrapt in this Ointment round about them, and at length covered them again with earth; and by this Device I had greater Pomegranates then ever the tree bare before. But now if you would go forward, and practise the same upon it the two next years following, questionless you might produce very huge Pomegranates, wonderful to be seen, as big as Gourds. Likewise we have caused *Beans to bring forth great cods,* by anointing them with this same ointment, and afterward sowing them in the earth: whereby we had great increase, both for the bigness of the Bean, and also of the cod. Also

Leeks and roots of Radish may be made greater;

if we translate them out of one place, and set them in another, as *Theophrastus* sheweth. If you would have

A Rape grow bigger and rounder,

you must sow it assoon as ever it is ready to be taken out of the husk: for by the advantage and benefit of the season wherein it is sowed, it will be the more augmented; because the root will thereby be the better filled, and the larger grown. Likewise *Florentinus* sheweth, how to make

Pease of a bigger growth.

If, saith he, you take Pease, and steep them in warm water the day before you sow them, they will grow the greater. Some men take more pains then needeth; who, because they would have a greater Pease growing, they steep them shells and all, and put Nitre into the water wherein they are steeped, and sow them in their shells.

Vitches may be made bigger,

if they be set with a little pole, to grow up thereby: for this will cause them to thicken, as *Theophrastus* saith. So also

Onions may be thickned,

as *Sotion* sheweth. About some twenty days before you translate them from the place where they first grew, you must dig away the earth about them, and let them lie a drying, that all moisture may be kept from them; and then plant them again, and they will grow much bigger. But if withal you pill of the top-skin, and so plant them, they will be far greater. Likewise we may cause

Artichocks to bear a fuller fruit,

as *Varro* sheweth. If you plant them in a well-soiled place, and cover them with old dung, and water them often in the summer-time, you shall by this means have a fuller and a more tender Artichock. We may also practise another Device whereby to make greater fruit, which *Theophrastus* hath set down; and he brings an Example, how to make *Pomegranates to grow greater then ordinary:* for Art may cause the greatness of Fruit. When the first buds be formed upon the boughs, they must be put into an earthen vessel that is made with a hole quite thorow; and the bough whereon they grow, must be swayed downward without hurting it: then cover the pot with earth, and so you shall have exceeding great Pomegranates. The reason whereof is this; The pot preserves the fruit from the vapours that would otherwise annoy it: and besides, the earth ministreth some moisture unto it; so that the bigness thereof is increased by the store of nourishment. It receives no more help from the tree, then if it were out of the earth; and therefore the kernels are no greater then ordinary; but the pill is much

thicker: the proper juice of it is somewhat wasted and consumed; for which cause the taste of this fruit so handled, is waterish and worse then others: but the rine receives outward nourishment, and spends none; for which cause that is much thicker. The like practise *Palladius* and *Martial* use, thereby to procure

A great Citron.

They take a Citron when it is young, and shut it up fast in an earthen vessel: for the Citron will increase continually, till it come to be of the bigness and fashion of the vessel wherein it is put: but there must be a hole made thorow the vessel, whereby the air may get in unto it. By the like device, *Theophrastus* assays to produce

Cucumbers and Gourds greater then ordinary,

by hiding them while they are young, both from Sun and from Winde, that nothing may come at them to hinder their growth. Like to this Device, is the setting of them in Fennel-stalks, or in earthen Pipes; whereby the natural Juyce and Nourishment is kept in, to the increasing of their growth. We will also shew, out of *Theophrastus*, a like Device, whereby the Herb

Alisander or Parsley may be made greater.

You must dig the Alisander round about the root, and cover it with Cachryl, and then heap earth upon it. For the roots spend all the moisture themselves, and suffer no nourishment to ascend into the buds. This Cachryl is hot and thick: and as by the thickness it draws nourishment to it, so by vertue of the heat it doth concoct and digest that which it hath attracted: and therefore seeing this doth both draw more nourishment to the Alisander, and also concoct it, there must needs be a greater augmentation of that herb. This practice he borrowed of *Aristotle*. This herb may also be made bigger by another means, namely, if when you plant it, you make a hole for it in the ground with a great stake: for the root will at length fill up the hole. So there is a means to make

A Radish-root grow bigger,

if it be planted in a cold ground, as *Pliny* sheweth. For Radishes are much cherished and delighted with cold; as in some cold places of Germany there be Radishes growing as big as a little childe. Some have reported, that if you drive a stake into the ground six inches deep, and put chaff into the pit which the stake hath made, and then put in the Radish-seed, covering it over with earth and muck, the Radish will grow up to the bigness of the pit. By a Device not much unlike to this, *Florentinus* sheweth how to

Make great Lettise.

You must remove them, and water them well; and when they are grown half a handful high, you must dig round about them, that the roots may be seen: then wrap them in Ox-dung, and cover them over again, and water them still; and when they are waxen bigger, cut the leaves cross with a sharp knife, and lay upon them a little barrel or tub that never was pitched, (for Pitch will hurt the herb) that so it may grow not in height, but onely spread forth in breadth. So the herb

Beet may be made greater,

as *Sotion* sheweth. To make Beet grow in bigness, saith he, thou must cover the roots over with some fresh Ox-dung, and divide the leaves or buds, and lay a broad stone or a tyle upon it, to cause it to spread forth in bredth. You may also make

Leeks greater,

by removing them, and laying a great stone or a broad tyle upon them: but in no case must they be watered. By the very same Device, *Anatolius* sheweth how to make

Garlick greater,

by laying tyles upon the roots thereof, as upon Leeks. *Theophrastus* sheweth another kinde of Device, whereby to make

Radishes greater;

and he saith that the Gardeners of his time were wont to practise it. They took away the leaves in the Winter-time, when they flourish most, and cast the Radishes into the ground, covering them over with earth; and so they lasted and grew till Summer came again, never shooting forth either into buds or leaves, except it were where the earth was gone, that they lay uncovered. The like Experiment doth *Palladius* teach, concerning the Rape-root, whereby to make

Rape-roots greater.

Assoon as you have plucked them up, you must strip off all the leaves, and cut off the stalk about half an inch above the root: then make certain furrows for them in the ground, for every one of them a several furrow; and there bury them asunder, about eight inches deep: and when you have cast earth upon them, tread it in; and by that means you shall have great Rape-roots. By the like means, *Theophrastus* thinks, we may procure

The herb Wake-robbin to grow greater.

When it is most full of leaves, and when the leaves be at the broadest, we must bow them downward, winding them round about the root within the earth, that so the herb may not bud forth, but all the nourishment may be converted to the head of the herb. So may we make

Onions to grow bigger,

as *Theophrastus* supposeth, if we take away all the stalk, that the whole force of the nourishment may descend downwards; lest if it should be diffused, the chief vertue thereof should spend it self upon the seeding. *Sotion* saith, that if a man plant Onions, he must cut off both the tops and the tails thereof, that so they may grow to a greater bigness then ordinary. *Palladius* saith, that if we desire to have great-headed Onions, we must cut off all the blade, that so the juyce may be forced down to the lower parts. In like manner, if we would have

Garlick-heads greater then common,

we must take all the greenish substance thereof, before it be bladed, and turn it downward, that so it may grow into the earth. There is yet another Device, whereby to make herbs and roots grow bigger then ordinary; but yet I like not so well of it, howsoever many ancient Writers have set it down: and first,

How to make Leeks grow greater.

Columella hath prescribed this course: you must take a great many Leek-seeds, and binde them together in thin linen clouts, and so cast them into the ground, and they will yeeld large and great leeks. Which thing *Palladius* also confirms by his authority, in the very same words. But both of them had it out of *Theophrastus*, who putteth it for a general Rule, That if a man sowe many seeds bound up together in a linen cloth, it will cause both the root to be larger, and the buds to be larger also; and therefore in his time they were wont to sow Leeks, Parsly, and other herbs after the same manner: for they are of more force when there be many seeds together, all of them concurring into one nature. Moreover, it makes not a little to the enlarging of fruits, to take the seeds which we would sow, out of some certain part of the former fruit. As for example: we shall procure

A Gourd of a greater or larger growth,

if we take the seed out of the middle of a Gourd, and set it with the top downward. This course *Columella* prescribes, in his *Hortulus*: Look, saith he, where the Gourd swells most, and is of the largest compass, thence, even out of the middle there-

thereof, you must take your seed, and that will yeeld you the largest fruit. And this is experienced not in Gourds onely, but also in all other fruits: for the seeds which grow in the bowels or belly, as it were, of any fruit, are commonly most perfect, and yeeld most perfect fruit; wheras the seeds that grow in the outward parts, produce for the most part weak & unperfect fruit. Likewise the grains that are in the middle of the ear, yeeld the best corn; whereas both the highest and the lowest are not so perfect: but because Gourds yeeld great increase, therefore the experience hereof is more evidently in them then in any other. Cucumbers will be of a great growth, as the Quintiles say, if the seeds be set with their heads downward; or else if you set a vessel full of water under them in the ground, that so the roots may be drenched therein: for we have known them grow both sweeter and greater by this Device.

Chap. XII.

How to produce fruit that shall not have any stone or kernel in it.

It is a received thing in Philosophy, especially amongst those that have set forth unto us the choicest and nicest points of Husbandry, that if you take Quicksets, or any branches that you would plant, and get out the pith of them with some earpicker, or any like instrument made of bone, they will yeeld fruit without any stone, and without any kernel: for it is the pith that both breedeth and nourisheth the substance of the kernel. But the Arcadians are of a quite contrary opinion: for, say they, every tree that hath any pith in it at all, will live; but if all the pith be taken out of it, it will be so far from yeelding any stoneless fruit, that it cannot chuse but die, and be quite dried up. The reason is, because the pith is the moistest and most lively part of any tree or plant: for the nourishment which the ground sends up into any plant, is conveyed especially by the pith into all the other parts: for Nature hath so ordained it, that all the parts draw their nourishment, as it were their soul and their breath, thorow the marrow or pith of the stock, as it were thorow a Squirt or Conduit-pipe. Which may appear by experience, seeing any bough or stalk, so soon as the marrow is gone, returns and crooks backward, till it be quite dried up, as the Ancients have shewed. But I for my part must needs hold both against *Theophrastus*, and against others also that have written of Husbandry, both that trees may live after their marrow is taken from them, and also that they will bring forth fruit having stones or kernels in them, though there be no pith in the trees themselves, as I have shewed more at large in my books of Husbandry. Notwithstanding, lest I should omit any thing belonging to this argument, I have thought good here to set down the examples which those Ancients have delivered in writing, that every man that lists may make trial hereof; and haply some amongst the rest using greater diligence in the proof hereof then I did, may finde better success herein then I have found. There be many means, whereby Plants may be deprived of kernels; as namely, by engraffing, by taking out their pith, by soiling with dung, or by watering, and by other Devices. We will first begin, as our wonted manner is, with engraffing; and will shew how to produce

A Peach-apple without a stone.

Palladius saith he learned this new kinde of engraffing of a certain Spaniard, which he saith also he had experienced in a Peach-tree. Take a Willow-bough about the thickness of a mans arm; but it must be very sound, and two yards long at the least: bore it thorow the middle, and carry it where a young Peach-tree grows: then strip off all the Peach-tree-sprigs all but the very top, and draw it thorow the hole of the Willow-bough: then stick both ends of the Willow into the ground, that it may stand bending like a bowe; and fill up the hole that you bored, with dirt and moss, & bind them in with thongs. About a year after, when the Peach-tree and the Willow are incorporated into each other, cut the plant beneath the joyning place, and remove it, and cover both the Willow-bough and the top of the plant also with earth;

earth; and by this means you shall procure Peaches without stones. But this must be done in moist and waterish places; and besides, the Willow must be relieved with continual watering, that so the nature of the wood may be cherished, (as it delights in moisture) and it may also minister abundant juyce to the plant that is engraffed in it. By the like experiment we may procure, as *Avicenna* shews, that

A Citron shall grow without any seed in it:

for, saith he, if we engraff it into a Quince-tree, it will yeeld such a fruit. *Albertus* promiseth to produce

A Medlar without any stones,

by engraffing it into an Apple-tree, or a Service-tree. But experience proves this to be false; yet surely, if it be so engraffed, it will have a softer kernel a great deal. The reason which brought the Ancients to think and write thus, was this: They saw that such fruits as have in them the hardest stones, do grow upon such trees as have in them the hardest pith; as the Dog-tree, the Olive-tree, the Damosin-tree, the Myrtle-tree, and the like: they saw also, that such trees as have a soft and a spungie kind of pith in them, as the Fig-tree, the Alder-tree, and such-like, bring forth fruit without any stones in them at all: and from hence they gathered and concluded, that it is the pith which nourishes the kernel. Which thing howsoever it hath some little shadow of truth in it, yet they should not have extended it generally to all plants, seeing experience proves it to fail very often. Now let us come to the second means whereby fruit may be prevented of their kernels; and this is by taking forth the pith or marrow. As for example: if you would procure the growing of

A Grape without any stone in it,

Democritus counselleth you to take a branch or twig of a Vine, and cleave it just in the middle, and either with a stone, or some instrument made of bone, fetch out all the pith, in that part which you will plant within the earth, or at least as far as you can hollow it without spoil: then presently bind up the parts together again with paper stiffly and tightly wrapped about them, and make a trench for them in some moist and very fertile soil, where you must plant them in one, and fasten it to some sure prop, that it may not be wreathed nor bowed; so will they soon grow up together into one, as they were before: but it would be much better, if you would put the clove or head of a Sea-onion into that part which you have robbed of the pith: for this is as good as glue to fasten them together; and the moisture hereof will keep them supple, as also the heat hereof will cherish them much. *Theophrastus* saith, that you may procure Grapes without any stones in them, if you rob the Vine-branch of the pith that is in it, whereof the stones are wont to be gendred. And *Columella* saith, that if you would have Grapes without stones, you must cleave the Vine-branch, and take out all the pith; but so, that the buds be not hurt thereby: then joyn it together, and binde it up again, so that you crush not the buds; and so plant it in a well-soiled ground, and there water it often: and when it beginneth to shoot up into slips, you must dig deep about it oftentimes; and when it cometh to bear, it will yeeld you Grapes without any stones. *Palladius* saith, there is a goodly kinde of Grape which hath no kernels in it, so that it may be swallowed down easily, and that with no small pleasantness, as if it were many Grapes stoned and supped up together. The manner of the procuring it is, as the Greeks record, by Art assisted with Nature, on this wise: The set which we would plant, must be cleft in the midst, so far as we mean to set it within the ground; and when we have picked and clean scraped out all the pith of those parts, we must close them together again; and when we have bound them hard up, set them in the earth: but the bond wherewith they are tied up, must be made of Paper or Parchment; and the ground where they are set, must be a moist place. Some go to work more precisely, and put the plant so cleft and made up again, into a Sea-onion, so far as the plant was cloven: for by the help thereof, all plants do sooner and easier take root. *Pliny* likewise saith, there is a new-invented kinde of Grapes, when the Vine-branch that is to be planted, is cloven

cloven in the middle, and all the pith scraped out, and the pieces knit up together again, with a special care that the buds receive no harm any way: then they set the Vine-branch in a well-soiled ground; and when it beginneth to shoot forth, they prune it, and dig often about it: the Grapes which it afterwards bears, will have no hard kernels in them, as *Columella* writes; howbeit, it is great marvel that there can be in them any kernels at all, though never so soft, seeing all the pith, which is the mother of the kernel, is quite taken away. But surely I for my part marvel at those who think it strange that a tree should live when this pith is gone, & are perswaded that a Vine-branch can bear fruit without kernels when the pith is taken out of it; seeing many men in the Country are eye-witnesses that there do many plants live without any pith in them; and seeing also it is impossible almost that any tree should bear fruit without kernels, because the kernel carries it self the very seed whereby one fruit may be generated of another. Likewise you may procure, as *Democritus* also sheweth,

Pomegranates and Cherries without any stones;

if in like manner you pick out the pith of the young plants that you set. And *Africanus* saith, If you deal with these as with Vine-branches, plucking out the pith after you have cleft them, and then plant them; and after a while cut off the upper parts of the plants when they have budded forth, then the Pomegranate set, will yield fruit without any kernels. *Palladius* borrows this same experiment of *Africanus*, and sets it down word by word as he doth. Likewise that

A Cherry-tree may bring forth fruit without any stone within;

Martial sheweth more distinctly. Cut off a young plant about two foot long, and cleave it as it stands in the ground, down to the root, and then fetch out the pith on both sides, and presently tie them up again fast, and cover the whole cleft both on the top, and on both sides, with muck; so shall they grow fast together again in one year: then engraffe some young sprigs of a Cherry-tree, such as never bare any fruit before into this stock, and by this means you shall procure Cherries without any stones at all. Others, that they might accomplish their purpose more speedily, did not cleave such tender young Cherry-trees, but bored a great hole thorough Trees of good growth, so that it might pierce the whole pith, and cross it in the middle of the Tree; then they put a stake or a wedge into it, which might stop the passage of the pith, that none might be ministred into the upper parts. In like manner *Africanus* teacheth how to procure

A Peach without any stone.

You must, saith he, bore a hole beneath through the body of the Tree, and having so cut off the pith from passing upward, you must fill up the hole with a stake of Willow or Prick-wood; so shall you intercept the pith from ascending out of the root into the branches. Some Writers there are, which shew how to procure stoneless fruit by diligence in dressing and trimming of plants. It is held for a rule in Husbandry, that soft, fat, and moist nourishment doth alter all wilde and unkindly fruit into that which is milder and more natural: It is a kind of mildeness in fruits, to have a little, soft and sweet kernel; as on the contrary, it is wildenesse to have a great and a hard kernel, for it cometh by reason of a kind of harsh and dry nourishment that the earth sends up into them. Wherefore no doubt but we may procure the kernel of a fruit to be smaller and more tender, by diligence and skill in dressing them. To begin with a Vine:

How a Vine may bring forth grapes without a harsh and stony kernel.

At such time as Vines are pruned, you must take a fruitful sprig, somewhat neer the top as you can, and there, as it grows, you must pick out the pith at the highest end, never cleaving it, but hollowing it with some fit instrument as well as you can, and there uphold it with a prop that it bow not down: then take some Cyrenian juice, as the Greeks call it, and pour it into the place that is hollow; but first you

you must steep this juice in water, to the thickness of sodden wine: and this you must do for eight dayes together every day once, till the vine-branch sprout forth again. *Columella* saith the very same; that the vine-branch as it grows upon the Vine must be cut, and the pith of it fetched out with some fit instrument, as well as you may, out of the top without the cleaving of the branch, but the branch being whole, and still growing on the Vine, you must put into it some Benjamin or Cyrenian juice steeped in water, as was shewed before, and set it upright with a prop, that the juice may not run forth; and this is to be done for eight dayes together. So if we would procure

A Myrtle without a kernel,

Theophrastus teacheth us how to do it. If you water the Myrtle-tree with hot water, then, saith he, the fruit will be the better, and without any kernel. Some affirm, that this experiment was found out by chance: for whereas there stood neer to a Bath, a Myrtle-tree which no man regarded, the Commers by took off some of the fruit by chance, and found them without any kernels; then they carried some home, and set them, and so this kind of fruit began first in Athens. *Didymus* also saith, that if the Myrtle-tree be often watered with warm liquor, it will yeeld berries without any stones or kernels within. *Theophrastus* sheweth yet another way whereby this may be effected; take, saith he, the filth or shavings of skins, and put them in Urine, and so lay them about the root of the Myrtle-tree at such time as the buds begin to shew themselves, and so shall you have berries that have either none at all, or else very small kernels in them. Likewise the Pomegranate may be produced without any kernels within it, if you lay good store of Swines-dung about the root of the Pomegranate-tree.

CHAP. XIII.

How fruit may be produced without any outward rines or shels.

THe very same helps and devices which we prescribed for the producing of fruits without their inner kernel, we may likewise use in the practice of producing Nuts, & such like fruits as are wont to grow in shells and rines, that they may grow naked as it were without any shel at all. And first this may be effected by taking away the pith out of the plants that bear them so.

A Nut without a shell,

may be produced, as *Damageron* teacheth. If you bore a hole quite thorough the Nut-tree, and put into it a stake of Elm to fill it up, you shall thereby stop the pith from ascending into the upper parts. and so no shells can grow because it is the pith only that causeth them. *Palladius* counselleth you to bore the hole through the root, and stop it up with a stake of box, or some wedge made of iron, or of copper. But *Theophrastus* sheweth, how to procure

Almonds and Chest-nuts with a soft shell,

and this is by skill in dressing the Trees. If you would soften and alter the fruit, we must apply the root with Swins-dung: for this is a very forcible worker; likewise often digging will cause both the plants to prosper better, and the fruit to become better also: for the kernels will be smaller, in such fruit as have any stones in them; and such fruit as grow in shells or rines, as Almonds, and Chest-nuts, will have the softer shell without, and the larger kernel within: for the greater store of nourishment there is applyed to the Tree, the moister it is, and the substance of the fruit is so much the more encreased. But *Palladius* would perswade us, that if we rid away the earth from the rootes

of the Almond-tree some certain daies before it begin to bloss[o]m, and all that while apply them with warm water, we shall hereby procure the Almond-shels to be very tender. If we would procure

That kinde of Nut which is called Nux Tarentina,

the same author *Damageron* hath shewed us how to do it. Every Nut and Almond will yeeld a mild fruit with a tender shell, if we continually apply the body and root of the tree with pouring ashes upon them; and likewise all other kind of fruits that grow in any shell or rine, may be so wrought upon, and will suffer the like alteration by the like means practised upon them. If you would procure a Tarentine Nut, *Palladius* saith, you must water the Tree with Lye thrice a moneth throughout a whole year, and so you may obtain your purpose. Others eff[e]ct such alterations by correcting the plants; as, by cutting off the tops of the roots. If the Nut be too hard-shelled, you may also remedy it by cutting and paring off the bark of the Tree, as *Damageron* sheweth; for by this means you draw down that harsh and wilde humour: The reason whereof is, because the bark of the Tree answereth to the shell of the fruit, as the pith of the Tree answereth to the kernel of the fruit; and therefore, as to amend the inner kernel we abated the pith, so to soften or amend the utter shell or rine of the fruit, we must abate the utter bark of the Tree. A thing which we have observed by another like example: for a Peach being engraffed upon a bitter Almond-tree, the pill of the fruit thence growing was so bitter, that it could not be eaten till the pill were pared off. This secret may stead you in many other experiments of the like kind. But this kind of Nut which we now speak of, I have growing in my own Orchard, and it hath such a tender shell, and so thin, that as soon as ever it is but touched, the shell falls off, and the fruit is bare and naked. *Florentinus* assayed to produce

An Almond without a shell,

on this manner: He break the shell very charily, so that the kernel was kept whole; then he took wool, and sometimes green leaves of the Vine or of the Plane-tree, and wrapt about the kernel, lest if he should have set it without any covering about it, the Emots or such like vermine should have gnawn it. *Columella* sheweth another device whereby we may procure

A Filberd to become a Tarentine Nut.

When you have made your pit wherein you purpose to set your Nut, put into it a little earth, about half a foot deep, and there plant the seed of Fennel-gyant; and when the Fennel is come up, cleave it, and within the pith of it put your Filberd without any shell upon it, and so cover it all over with earth: this if you practise before the Calends of March, or betwixt the Nones and the Ides of March, you shall have your purpose. They prescribe likewise another device, whereby

Gourds may bring forth fruit without any seeds within them:

The Gourd, say they, will grow seedless, if you take the first branch or sprig of a Gourd when it is a little grown up, and bury it in the earth as they use to deal by Vines, so that onely the head thereof may appear; and so soon as it is grown up again, to bury it so again: but we must have a special care that the slips which grow up out of the stalk be cut away, and none but the stalk left behind; so shall the fruit that grows upon it, whether it be Gourds or Cucumbers, be destitute of all seed within. Likewise they will grow without seeds in them, if the seeds which are planted, be macerated or steeped in Sea-samine oyle, for the space of three dayes before they be sowed.

CHAP.

Chap. XIIII.

How to procure fruits, to be of divers colours, such as are not naturally incident to their kinde.

NOw we will shew how to colour fruits: to the effecting whereof there have been divers means devised; as waterings, and engraffings which can never be sufficiently commended or spoken of, and other like practises. To begin with engraffing; If we would colour any fruit, we must engraffe it upon a plant that flourishes with the same colour which we would borrow. As for example, If we would produce

Red Apples,

we must engraffe them upon a Plane-tree, and the fruit will be red, as *Diophanes*, *Didymus*, and *Palladius* affirm. So we may procure that the fruit

Rhodacen shall grow red,

if we engraffe it upon a Plane-tree, as *Africanus* witnesseth. Of whom *Palladius* learned that the way to make Rhodacens look red, is to engraff them into a Plane-tree. If you would have

Citrons of a red scarlet-colour,

Avicenna shews you may effect it by engraffing them into a Pomegranate-tree; for we shewed before that such an engraffing may well be made. But if you would have

Citrons to be blood-red,

Florentinus sheweth that you may effect this by engraffing them into a Mulberry-tree; which experiment *Diophanes* approveth. Likewise he that desires to have

Red Pears,

must engraffe them into a Mulberry-tree; for by this means the Pears will grow red, as *Tarentinus* and *Diophanes* do witnesse. So also you may procure

A white Fig to become red,

by engraffing it upon a Mulberry-tree, as the same *Diophanes* witnesseth. By the same means

Apples may be of a blood-red colour,

if they be engraffed into a Mulberry-tree, as *Avicenna* sheweth. But *Beritius* and *Diophanes* write, that the Mulberry-tree it self, which makes all other Apple-fruit to become red, may be caused to bring forth

White Mulberries,

if it be engraffed into a white Poplar tree; for this will alter the colour of the fruit. But *Palladius* procures this effect by another means; not by engraffing the Mulberry into a white Poplar, but into the Fig-tree; for this also will alter their colour, and cause

White Mulberries,

as he shews in his verses; wherein he saith, that the Fig-tree doth perswade Mulberries to change their own colour and to take hers; whereof I my self have seen the experience, Likewise, of

A white Vine may be made red Wine,

 if

if we engraffe a white Vine into a black: for the stock into which it is engraffed, will alter the colour much, as I have seen by experience in hony-grapes, those which we call Greek-grapes; for the Vines which have been engraffed upon those Greek-Vines, have yeelded a blackish juice or wine; and the oftner such engraffing hath been made, the blacker juice was yeelded. In the places about the Hill Vesuvius the white-wine grape, which grows upon her own stalk that is engraffed into the Greek-vine yeelds a more high-coloured wine then others do. Another way to make

Apples grow red,

is by diligent and cunning dressing, even by applying them with hot and fat receipts; for there are two chief Elements or principles of colours; white, and black, or dark coloured; now by dressing them, and applying fat things unto them, we may procure every flower or fruit that is blackish, to become brighter and fresher coloured; whereas on the other side, if they be neglected, that we do not bestow pains and care in trimming them, their colour will not be so lively, but degenerate into a whiterish hew; for all colours that begin to fade, wax somewhat whitish. *Beritius* therefore, endeavouring to make Apples grow red, watered them with Urine, and so obtained his purpose. But *Didymus*

To procure red Pomegranates,

watered the Tree with Bath-water sodden into Lye, and some other water mixed therewith. But there is yet another device, whereby we may procure

Apples to grow red,

by opposing them directly to the greatest force of the Sun-beams; for this will make them red. *Beritius*, that he might cause the reflex of the Sun-beams to be more forcible upon the fruit, used this sleight. He fastened certain stakes into the ground, and weighing down the boughs that had fruit upon them, he bound them charily without hurting the fruit to those stakes; and neer thereunto he digged certain ditches filling them with water, or else would place some other vessels full of water neer the boughs; casting this in his conjecture, that surely the heat of the Sun lighting upon the water, would cause hot vapours, which being reflected together with the heat of the Sun into the places neer adjoyning where the fruit hangs, and so reflected upon the fruit, would procure them to be of a reddish and a goodly colour. *Beritius* assayed to procure

Red Apples,

by another devise, by a secret kind of operation. Under the Tree he was wont to set Roses, which did lend their goodly hew to the Apples that grow upon the Tree above them. *Democritus* practised the like device not upon Apples, but upon Rhodacens, and made

Red Rhodacens,

by planting Roses underneath the Tree, round about the roots. Likewise we may colour fruit by colouring the seeds of them; for look what colour we procure in the seed, either by steeping it in some coloured liquor, or by any other means, the fruit will grow to be of the same colour which the seed is, when it is set or sown. As for example, we may colour

Peaches,

with Sanguinary or Vermillion; If we bury a Peach-stone in the ground, and take it up again seven dayes after (for in that time the stone will open of it self) and then put into it some Vermillion, and bury it in the earth again, and afterward look carefully unto it, we shall thereby procure Vermillion-peaches. And *Democritus* is perswaded, that if we should put into it any other colour after the same manner, the Peach would be of that other colour. It is a thing commonly reported among us, and it is not unlike to be true, that

Peaches may be of a sanguine-colour,

by another means. You must take a Peach-stone, and put it into a Carrot that is then growing, and the stalk which grows of that stone in the Carrot, if it be carefully nourished and preserved, will bring forth Peaches of a sanguine colour. In like manner, If you would have

White kernels growing in a Pomegranate,

Palladius sheweth how to do it, by the authority of *Martial.* If you take chalk and white clay, and with them mingle a quarter so much plastering, and apply the Pomegranate-tree roots with this kind of soilage or dunging, for the space of three whole years together, you shall obtain your purpose. Likewise, if you desire

Mellons of a Sanguine colour,

you must take Mellon-seeds, and steep them in sanguine liquor for three or four daies together before you set them, you may easily have your desire. Or else, if you open a little the skin of the seed, and put within it the juice of red Roses, Clove-gilliflowers, and Black-berries that grow upon Brambles, or of any other like thing, so that it be not hurtful to the seed, you may effect your purpose. And I suppose that the sanguine-coloured Mellons which are seen in these Countries, are thus used, that they may be of this colour. Consequent upon these devices is that sleight whereby

A Peach may grow with any writing upon it.

The Greeks affirm, that a Peach may be made to grow with a writing upon it, if you take out the stone and bury it in the earth for seven dayes; and then when it begins to open, pluck out the kernel, and write in it what you will, with Vermillion-juice: then binde up the kernel into the stone again, and set it so into the ground, and you shall have growing a written fruit. Now as the Sun doth colour the herbs that it may well come at, as we have shewed; so by keeping the force of the Sun away from them, we may whiten them; for so

A Lettice may be made white,

as *Florentinus* sheweth. If you would, saith he, procure goodly white Lettice, then must you bind together the tops of the leaves, two dayes before they be gathered; for so they will be fair and white. Likewise you may whiten them by casting sand upon them. And with us

Artichocks are made white,

by the very same means which we speak of. And if you would cause

Beets to become whiter then ordinary,

you must cover the roots over with Cow-dung, and as we spoke before concerning Leeks, so here you must cleave the bud, and lay a broad stone or a tile upon it, as *Sotion* sheweth. So *Columella* teacheth how to make

Endive to grow white,

when the leaves are shot forth, you must tie them about the tops with a small string, and cover them over with an earthen vessel set fast into the ground, and the herb will be white. Others are at less charges, and cover them over with some earth our Gardeners lay them in sand, and so make them very white. If you would procure

White Sperage,

you must put the slips as soon as ever they appear out of the earth, into a broken reed; and there let them grow for a while, and afterward when you take away the cane or reed, the Sperage will be whiter then ordinary.

CHAP.

CHAP. XV.

How the colour of Flowers may also be changed.

IN transforming and medling the colours of flowers together, we may procure such strange medleys, as nothing can be more delightful to be seen. Those which are of a deep purple colour may be meddled with azure blue; those which are as white as milk, may be meddled either with a duskish hew, or with a green, or crimson, or some other compound colours; in the beholding whereof, the minde cannot chuse but be affected with great delight, and be ravished with admiration, and as it were quite overcome with the excellent beauty of them. Wherefore we will set down certain Rules, whereby we may be able to alter the colour of flowers, as we prescribed certain rules before, whereby we shewed how to alter the colour of fruits. And first we will shew, how by engraffing

Gilliflowers that are of themselves purple, or else white, may become azure blue,

You must cut off (somewhat neer the root) a stalk of Endive or Blue-bottle, or Bugloss, but the old wilde Endive is best for this purpose, and let it be grown to an inch in thickness; then cleave that in the middle which is left growing in the ground, and plant into it a Gilliflower new pluckt up out of the earth, root and all; then bind up the stalks or slips with some slight bond, and lay good store of earth and dung round about it: so shall it yield you a flower, that is somewhat bluish, of a most delightful colour to behold. This, many of my friends will needs perswade me, though for my own part, I have often made trial of it, and yet never could see it effected. But this I have seen, that a white Gilliflower-slip being engraffed into a red Carrot made hollow for the same purpose, and so buried in the earth, hath yeelded a Sea-coloured flower. Likewise you may procure the white Gilliflower to be of a skarlet-colour, if after the same manner you engraffe it into the root of Orchanet: by which means also you may turn a purple Gilliflower into a skarlet. If you would have

A Rose, as also the flower Jasmine to be of a yellow-colour,

you may procure it by engraffing either of them into a broom-stalk: for of all other, the broom-flower is most yellow: and though we cannot do it so well, by clapping the leaf or the bud of the one upon the leaf or bud of the other, yet it may be effected by boring into the stalk after this manner. You must set a Rose or a Jasmine neer to the broom, and when they are somewhat grown, take them up together with the earth that is about them; (for they will prove better when they are set again, with their own earth which is about them, being as it were their mother, then with any other earth that shall be as it were their step-mother,) then bore a passage into the broom-stalk, and when you have cleansed the passage, prune the rose-stalk and plant it into the broom: and there cover them with loam where the engraffing was made, and so bind it up. Afterwards when the set is grown into the stock, you must cut off all the head somewhat above the engraffing place; so shall you have a Rose or a Jasmine there growing, of a lovely yellowish colour. Which kind of flowers are very usual with us, and this their borrowed colour is so orient and bright, that the eye is scarce able to endure the brightness thereof. There is another means also whereby we may colour flowers, and that is by pouring some colouring into the roots. If you would have

Lillies to be red,

we will shew how to do it, as *Florentinus* hath shewed us. Take a Lillie-clove or head, and when you have opened it well, pour into it some Sinoper, or any other colouring, and the Lillie-flower that grows out of the clove so dressed, will be of the same colour. But you must be very careful that you hurt not the clove or head, when you so open it; and besides, you must be sure to cover it with fat and well-soiled earth. By the like means you may procure

Lilly-flowers of a purple colour.

The manner whereof, *Anatolius* sheweth to be this. You must take ten or twelve Lilly-stalks, about such time as they be ready to yeeld flowers, bind them all together and hang them up in the smoak: then will there spring out of them some small roots, like unto a Scallion. Therefore when the time of the year serves to set them, you must steep the stalks in the Lees of red Wine, till you see they be throughly stained with that colour: then you must take them asunder, and set every one of them by it self, watering them still with the same Lees; and so you shall have Lillies that bear a purple flower. *Cassianus* attempted by the very like means

To produce white Ivy:

He steeped it in white Marle, and covered the roots of it with the same morter for eight dayes together, and it brought forth white berries. We may effect the like matters by careful manuring and dressing of fruits; for if we apply them with fat and fertile muck, the flowers will be a great deal the better coloured, and may be made blackish; as we have often proved in Clove-gilliflowers, which we have procured to be so deep coloured, that they have been even black. And on the contrary

Roses, Clove-gilliflowers, and Violets will wax of a whiterish colour,

if they be not carefully lookt unto, that either you do not water them well, nor transplant them, nor dig about them, nor feed them with muck; for by this means *Theophrastus* writeth, not only these kinds of flowers, but almost all other, that grow in Woods and Forrests unregarded, do become whiterish. But *Didymus* hath devised another kind of sleight divers from these, whereby to make Roses and Clove-gilliflowers to become white very suddenly; and this is, by smoaking and perfuming them with brimstone about the time that they begin to open.

CHAP. XVI.

How fruits and Flowers may be made to yeeld a better savour then ordinary.

AS it is pretty and delightsome to see fruits and flowers wear a counterfeit colour; so it is worth our labour to procure in them a more fragrant smell, then their ordinary kind is wont to afford: which thing we may effect by divers wayes, by planting, by watering, and by other devices. And for example sake, we will first shew, how to make

Limons to become very odoriferous.

If we take that least kind of Limons which is called *Limoncellum picciolum*, and engraff into a Citron-tree, the stock will inspire the fruit with a very goodly smell; and the oftner that you so engraffe it, the sweeter smell it will afford, as by daily experience we have tried in our Naples Gardens. So also we may procure

Very odoriferous Pears,

by engraffing them upon a Quince-tree, for the stock thereof will lend the fruit a grateful savour. *Diophanes* avoucheth, that

Apples may be made more odoriferous,

if they be engraffed into a Quince-tree; and that hereby are procured those goodly Apples which the Athenians call Melimela. And I suppose that the Apple called *Appium malum*, was produced by the often engraffing of an Apple into a Quince-tree: for the smell of it is somewhat like a Quince; and it is not unlike that *Appius Claudius* found it out, and first procured it by the same means. Likewise we have with us great red Apples, and some of them of a murry colour, which yeeld

yield the same smell; and questionless could never be produced but by the same means. So we have procured

The Centifole Rose to be more odoriferous.

If you would do so too, you must engraffe it into that kind of Rose, which, by reason of the sweet smell of Musk that it carries with it, is called Moschatula; but you must oftentimes reiterate the engraffing of it again and again: so shall it be more beautiful, and fuller of leaves, and smell sweeter. But it is best to engraffe it by Inoculation, by clapping the bud of the one upon the bud of the other; for so it will take soonest, and prove best. By a sleight not much unlike to this we may procure

Vines to smell of sweet ointments,

as *Paxamus* sheweth. If you would have the Vine to smell sweetly, and the place where it groweth, you must take the branches and cleave them, and pour in sweet ointments into them when you are about to plant them. But your labour will take the better effect, if you first steep the branches in sweet oyle, and then plant or engraffe them. I have practised an easier and slighter way, besmearing the branches that are to be engraffed, with Musk, or else steeping them in Rose-water, if the Musk did not stay upon them. So also we could make

Limons to be as odoriferous as Cinnamon,

by taking the sprigs that are to be planted, and besmearing them with oyle or the water of Cinnamon, and dressing them with much industry and diligence: And this kind of Limons is usual amongst us, and is termed by the common-people *Limoncellum incancellatum.* There is also another device whereby fruits may be made odoriferous, and to smell of Spices; and this is, by taking the seeds of them, and steeping them in sweet water before they be sowed. As for example: If we would procure

Odoriferous Artichocks,

Cassianus hath declared out of *Varro*, the manner how to effect it. You must take Artichock-seeds, and steep them for the space of three dayes in the juice of Roses, or Lillies, or Bayes, or some other like, and so to set them in the ground. Also you may make Artichocks smell like Bayes, if you take a Bay-berry, and make a hole in it, and put therein your Artichock-seed, and so plant it. *Palladius* records out of the same Author, that if you steep Artichock-seeds for three dayes together in the oyle of Bayes, or Spikenard, or Balme-gum, or the juice of Roses, or of Mastick, and afterward set them when they are dry, that then the Artichocks that grow out of those seeds, will yeeld the smell and savour of that which the seeds were before steeped in. *Florentinus* makes

Mellons of the fragrant smell of Roses,

after this manner; by taking Mellon-seeds, and laying them up amongst dry Roses, and so planting them one amongst another. I have procured Mellons to smell like Musk, by opening that part whereby the seed sprouts out, and steeping them in Rose-water wherein some Musk was distilled also, and so planting them after two dayes steeping. So we have procured

Odoriferous Lettice,

by taking the seed of Lettice, and putting it into the seed of a Citron, and so planting it. After the same manner, you may learn to make

Flowers grow that shall smell of Cloves;

if you take the seeds of those flowers, and lay them in Clove-powder, or the oyle of Cloves, or Clove-water distilled, and so set them: for by this means, the flowers will entertain the smell and savour of the Cloves. And this I take it, was the cunning

the cunning sleight whereby our ordinary Clove-gilliflowers were first produced; for questionlesse Gilliflowers do grow everywhere of themselves without any such pleasant smell; and besides, they are of a smaller assize, and of their own kinde somewhat wilde. But it should seem, that Gardeners did by their industry and trimming, bestow the smell of Cloves upon them, by steeping their seeds in Clove-water, or by suppling them with the oyle of Cloves, or else by sticking Cloves in the roots of them, and so planting them. We may adde to these sleights another device,

How to make Garlick grow that shall not smell rankly and unsavourily.

Sotion hath taught us the way. If, saith he, you do set Garlick, and pluck it up again, both, when the Moon is underneath the earth, it will not have any bad savour. And *Theophrastus* hath taught us a means

How we may procure Roses to yield a more odoriferous smell,

namely, if you take Garlick, and plant it neer your Roses.

Chap. XVII.

How to procure fruits to be sweeter and pleasanter for taste.

THere are some trees, which cannot away with any scar, but if you cut their stock never so little, or make any other scar in them, presently the Air and the extrinsecal heat get in, and so the Trees perish; for the corruption will fall downward to the root, and so make the Trees presently to wither and fade away. Now there are other Trees, which will abide not only a scar, but also to have their stock cleft, and to be bored into; yea, and by this means too, they will bear fruit more plentifully; as doth the Pomegranate-tree, the Almond-tree, and the Apple-tree; of all which there is very great use. The reason hereof is this: Their nature and kinde is, to receive so much nourishment as is sufficient for them, and to void away hurtful and superfluous humours: for as those living creatures which sweat most, or have some other issue in their bodies, are most healthful and wont to live longest; so when these Trees have a cut or a scar in them whereby they sweat out, as it were, their hurtful and superfluous moisture, they do more easily digest that moisture which is left behind within them; and the better that the moisture is digested, the sweeter and pleasanter is their juice. And besides, they will live, if the parts have any continuation at all, though it be never so little, only if they may but hang together: and therefore they will easily defend themselves from any harm that may happen unto them by the cutting or mangling of any of their parts. We will shew how to procure fruits that shall be sweeter in taste then ordinarily their kind is wont to afford, first by engraffing, secondly by boring or cutting, and last of all by other means. And first, by engraffing we may procure

Cherries that shall have in them the relish of Bayes,

For as we have shewed before, engraffing may amend those defects that are in plants and endue them with better qualities: so that if you have any fruit that is loathsome, because it is too sweet, do but engraffe it into a bitter Tree, and there will be such a medley, that your fruit shall have a very savoury relish. *Pliny* saith, that if you engraffe a Cherry upon a Bay-tree, you shall have Cherries thence growing, that will have the smatch of the Bay. *Palladius* saith the same, engraffe a Cherry upon a Bay-tree, and the fruit that grows thence, will have the relish of the Bay. In my time, there have been seen certain Cherries in Naples, which they called Bay-cherries, somewhat bitter, but yet pleasant withal; a most excellent kinde of fruit, far better then any other cherries, of a very large assize, full of juice, of a very sanguine colour, that have a bitter-sweet taste, so that they are neither loathsome for their overmuch sweetnesse, nor yet to be refused for their overmuch bitternes. So likewise may be procured

Sweeter Apples by engraffing them into a Quince

For if you do engraffe an Apple into a Quince, the Apple will have a relish like honey: which kinde of fruit the Athenians do therefore call Melimela, because they taste like honey, as *Diophanes* sheweth. Now we will shew also, how by husbandry and skilful dressing, fruits may be made sweeter in taste; namely, by piercing or boring the stock, or scarrifying it round about, or by some other chastisements, as the Husband-men are wont to call them; for by these means, the trees may purge themselves of their superfluous moisture, and so they will bear the sweeter fruit. As for example: If you would learn,

How to procure the Almond-tree to yield fruit without any bitterness.

Aristotle hath taught you the way. You must knock a great nail into the body of the Almond-tree, that the gum of the Tree, which causeth the bitternesse of the fruit, may drop out by that passage. And this is such a sleight that hereby you may tame, as it were, wilde Trees, and alter their nature into a milder kind. *Theophrastus* saith, that if you dig round about the stock of the Almond-tree, and bore thorough it about nine inches above the ground, the gum will thereby drop out, and so the fruit will become the sweeter by that chastisement. If you cut off a bough, or an arm of it, so that the gum may have egresse that way, and if you wipe away the gum still as it cometh forth, and observe this for two or three years together, you may by this means alter a bitter Almond-tree into a sweet one. For the bitternesse proceeds from no other cause, but onely from the superfluity of nourishment and moisture, which is abated by boring into the stock: and when once that which is superfluous is evacuated, then that which is left, is more easily concocted, and so the tree becomes fertile in bringing forth a sweeter and a better fruit. *Africanus* likewise affirmeth, that if you dig about the stock of a bitter Almond-tree, and make a hole into it some four inches above the root, whereby it may sweat out the hurtful moisture, it will become sweet. *Pliny* saith the same; If you dig round about the stock, saith he, and bore thorough the lower part of it, and wipe away the humour which there issueth forth, a bitter Almond-tree will become sweet. Some there are, who after they have made that hole, do presently put honey into it, that it may not be quite empty; for they are of opinion, that the relish of the honey is conveyed up into the fruit, through the pith, as thorough a Conduit-pipe. As for example sake; If we would procure

Sweet Citrons;

(for that kind of fruit was not wont to be eaten in *Theophrastus* time, nor in *Athenæus* time, as himself reports, nor yet in *Plinies* time:) *Palladius* hath shewed, how to alter the bitter pith of a Citron-tree into sweet. His words are these. It is reported that the bitter pithes of Citrons may be made sweet, if you take the Citron-seeds, and steep them in honey-water, or else in Ewes milk, (for this is better) for the space of three dayes before you set them. Some do bore a hole sloaping into the body of a Tree, but not quite thorough it; by which passage the bitter humour drops away: This hole they make in it about February, and leave it so, till the fruit is fashioned; but after the fruit is fashioned, then they fill up the hole with morter; and by this device the pith is made sweet. This hath *Pontanus* set down in his book called, *The Gardens of Hesperides*. What is it, saith he, that Art will not search into? Cut a thick Vine, and make it hollow on the the top, about thy hand breadth; but so, that the brims of the hole be brought round and something close together, so that the sides be about an inch thick and no more. Pour into it and fill it up with liquefied honey, and cover it with a broad stone that the Sun may not come at it. And when the Vine hath drunk in all that, then fill it up again with the like: and when that is soaked in too, then open the concavity wider, and let the Vine grow: but you must continually water the tender roots thereof with mans water: and you must be sure that you leave no buds or leaves upon the stock, that so there may be no other moisture let into it, but the whole Vine may grow up as it were in a spring of honey. *Palladius* shews also

How

How to make sweet Almonds of bitter ones,

even by boring a hole in the middle of the stock, and putting into it a woodden wedge besmeared over with honey.

Sweet Cucumbers

may be procured, by steeping Cucumber seeds in sweet waters, till they have drunk them up: for they being planted, will produce sweet Cucumbers. *Theophrastus* shews how to make sweet Cucumbers, even by the same sleight; by steeping their seed in milk, or else in water and honey sodden together, and so planting them. *Columella* saith, that a Cucumber will eat very tender and sweet, if you steep the seed thereof in milk before you set it. Others, because they would have the Cucumber to be the sweeter, do steep the seed thereof in honey-water. *Pliny* and *Palladius* do write the same things of the same fruit, out of the same Authors. *Cassianus* hath declared out of *Varro*, how to procure

Sweet Artichocks growing.

You must take the Artichock-seeds, and steep them in milk and honey, and after you have dryed them again, then set them, and the fruit will relish of honey. So you may procure

Sweet Fennel growing,

For if you steep Fennel-seeds in sweet wine and milk, then will the fruit that grows of those seeds, be much sweeter. Or else if you put the seeds thereof in dry figs, and so plant them, the like effect will follow. So you may procure

Sweet Melons,

as *Palladius* shews; even by steeping the seeds thereof in milk and sweet wine for three dayes together: for then if you dry them, and set them being so dryed, there will grow up a very sweet fruit. Likewise you may procure

Sweet Lettice;

for if you water them in the evening with new sweet wine, and let them drink for three evenings together as much of that liquor as they will soak up, it will cause sweet Lettice, as *Aristoxenus* the Cyrenian hath taught out of *Athenaus*. So

A sweet Radish may be procured,

by steeping the Radish-seeds for a day and a night in honey, or in sodden wine, as both *Palladius* and *Florentinus* have recorded. So you may procure the same, by steeping the seeds in new sweet wine, or else in the juice of Raisons. There is also another device, whereby to make sharp or bitter fruits to become sweet; and this is by art and cunning in dressing them; as, by pouring hot water, or the Lees of oile, or casting soil and such like about their roots. As for example: when we would make

A bitter Almond to become sweet,

we cast some sharp piercing matter upon the root, that by vertue of their heat, the Tree may the more easily concoct her moisture, and so yield a sweeter fruit. *Theophrastus* saith, that if we apply hot and strong soil, as Swines-dung, or such like, to the root of the bitter Almond-tree, it will become sweet: but it will be three years before the Tree be so changed, and for all that time you must use the same husbanding of it. *Africanus* saith; If you uncover the roots, and apply them still with Urine, or with Swines dung, then will the fruit be the sweeter. The Quintils report of *Aristotle*, that, by covering the Almond-tree root with Swines-dung, in March, of a bitter one it becometh sweet. And *Palladius* useth the very same practise. By the same device

Sharp and sowre Pomgranate-trees may be made to bring forth a sweet Pomegranate: for these also may be changed from sharp and sowre into sweet. *Aristotle* shews in his book of plants, that Pomegranate-trees, if their roots be applyed with Swins-dung, and watered with soom cool sweet liquor, the fruit will be the better and the sweeter. *Theophrastus* saith, that the roots of a Pomegranate-tree must be applyed with Urine, or with the offals and refuse of hides, yet not in too great a quantity: for the roots of this kind of Tree have need of some sharp matter to knaw upon them, and most of all, every third year, as we said before of the Almond-tree; but indeed the Pomegranate-roots are more durable. The reason is, because of a kind of softnesse in the roots, which is peculiar unto them alone. Now Swines-dung, saith he, or somewhat that is of the like operation, being cast upon the roots, doth sweeten the juice of the Tree: as also if you pour on good store of cold water, it will work some kind of change thereof. *Paxamus* prescribes this course, to dig round about the root of the Tree, and to lay Swins-dung upon it, and then when you have cast earth upon that, water it with mans Urine. *Columella* saith; If you have a Pomegranate-tree that bears a sharp and a sowre fruit, this is your way to amend it: You must cover the roots with Swins-dung and mans ordure, and water them with mans Urine that hath stood long in some vessel; and so it will yield you for the first years a fruit that tastes somewhat like wine, and afterward a sweet and pleasant Pomegranate. *Pliny* reporteth the very same thing out of the very same Authors. *Anatolius* shews

How to make an Apple-tree become sweeter;

and that is, by watering it continually with Urine, which is a thing very comfortable to an Apple-tree. Some do use Goats-dung and the Lees or dregs of old wine, applying them to the roots of the Apple-tree, and thereby cause it to bear a sweeter fruit. *Theophrastus* saith; If you water an Apple-tree with warm water in the Spring time, il will become better. The like applications being used to Herbs, will make them sweeter also. As for example sake; we may procure

Sweet Endive.

There be many things, which being watered with salt liquors, do forsake their bitternesse, and become sweet. Of which sort Endive is one: and therefore if we would have sweet Endive, *Theophrastus* willeth us, to water it with some salt liquor, or else to set it in some salt places. The like practise will procure

Sweet Coleworts.

And therefore the Ægyptians do mix water and Nitre together, and sprinkle it upon Coleworts, that they may be sweet: And hence it is that the best Coleworts are they which are planted in salt grounds: for the saltnesse, either of the ground where it is set, or of the liquor wherewith it is watered, doth abate and take away the tartnesse and natural saltnesse of the Coleworts. In like manner, if you would procure

Sweet Betony,

Theophrastus counselleth you to water them with salt liquor, and so they will be better. Which very same things *Pliny* reporteth out of the same Author. Likewise you may procure

Sweet Rochet,

such as will yeeld leaves that shall be more toothsome, if you water it with salt liquor. There is another sleight in husbanding of Pot-herbs, whereby they may be produced fitter to be eaten; and this is by cropping the stalks of them,

Basil will grow the sweeter,

if you crop the stalk of it: for at the second springing, the stalk will be sweeter and

and pleasanter ; a most evident reason whereof is assigned by *Theophrastus*. So

Lettice will be the sweeter

at the second springing. *Theophrastus* saith, that the sweetest Lettice springs up after the cropping of the first tops ; for the first tops of their first springing, are full of a milky kind of juice, which is not so pleasant, because that it is not throughly concocted ; but they which grow at the second springing, if you take them when they are young and tender, will be far sweeter. He shews also, how

Leeks may be made sweeter ;

by cropping them once or twice, and afterward let them grow : the cause whereof he hath assigned in his book of causes, namely, that their first shooting up is the weakest and the most unperfect. The like is to be thought and practised in other Potherbs : for the cropping or cutting off, doth make the second sprouts to be the sweeter, almost in all herbs. There are also divers other sleights in husbanding and dressing of such Pot-herbs, whereby they may be made sweeter to be eaten. As for example,

Garlick may be made sweeter,

for *Sotion* is perswaded, that, if you break the Cloves of Garlick before you set them, or else supple them with the Lees of oyle, when you do set them, they will gather and yield a far sweeter relish. By another sleight far differing from this,

Onions may be made sweeter ;

for we must consider, that divers things do exercise a mutual discord or agreement & concord of natures toward each other; whereby they either help one another, if their natures agree ; or, if their natures dissent, they hurt and destroy one another. Nuts and Onions have a sympathy or agreement of nature ; and therefore if you lay up Nuts amongst Onions, the Onions will cause the Nuts to last the longer : in liew of which kindness, Nuts do gratifie Onions with another good turn, for they ease the Onions of their sharpnesse, as *Palladius* hath observed.

Chap. XVIII.

How fruits that are in their growing, may be made to receive and resemble all figures and impressions whatsoever.

MAny things do fall out by chance, and hap-hazard, as they say, which an ingenious man lighting upon, doth by his great industry, and often experiments that he makes of them, turn and apply to very good use. Whence it is that the Poet saith, manifold experience, and much labour and practice, sets a broach to the world many new arts and rare devices. And because the most part are not acquainted with the cause of such things, thence it is, that they are esteemed to be miraculous, and to come to passe besides Natures rule. We have oftentimes seen in Citrons, divers kinds of stamps and impressions, which were made there by chance ; as by the hitting of some carved matter, or any stick, or such like, which hath caused the same impressions : whence, the wit of man hath devised to cause divers kinds of fruits, to grow up with divers kinds of figures on them. If you take an earthen vessel, and put into it an apple that is very young, as it hangs upon the Tree growing, the Apple will grow to fill up his earthen case, and will be of any form whatsoever you would desire, if you make the case accordingly. Also if you pown any colours and bray them together, and dispose of them in places convenient on the fruit, on the inside of the case, the fruits will wear and expresse the same colours, as if they were natural unto them. Whence it cometh to passe, that oftentimes the yellow Quince is made to grow like a mans head, having in it the lively resemblance of white teeth, purple cheeks, black eyes, and in all points expressing the form and colour of a

mans

mans head, without any greenesse at all, which is the natural colour of that fruit whiles it is in growing. And this is the sleight that *Africanus* prescribes, whereby

A Citron may be made to grow in the likenesse of a mans head, or the head of an horse, or any other living Creature.

You must take some Potters clay, or soft morter, and fashion it to the bignesse of a Citron that is at his full growth: but you must cleave it round about with a sharp instrument, so that the fruit may be taken out of it handsomly; and yet in the mean space the sides of the case must be so closely and firmly joyned together, that the fruit growing on, may not break it open. If the counterfeit or case which you make, be of wood, then you must first make it hollow within; if it be of clay, you may clap it on, as it is, so that it be somewhat dry. But then when the fruit comes to be of a greater and stronger growth, you must prepare earthen vessels made for the purpose, with a hole in them at the lower end, that the stalk of the fruit may there be let in: Into these earthen vessels you must enclose the fruit, and binde them about with a strong band, for otherwise the growth of the fruit will break them open: And when you have procured the fruit to grow up into his counterfeit, or sheath as it were, that it is come to the just bignesse of a fruit of that kinde, it will bear the same shape and figure which you would have in it. The like we have shewed before out of *Florentinus*. *Pontanus* also speaks of the same device. If, saith he, you would have a Citron to grow in divers shapes, you must cover it being young, with some counterfeit of clay, or wood, or earth, wherein it may be swadled; as a tender infant in his Nurses bosom: and that counterfeit will fashion the fruit into any form; and when it is taken out, it will resemble any image that you have carved within the counterfeit. So also you may deal by

Pomegranates, Pears, or any kind of Apples, making them to receive any kinde of form,

for the same Author writes, that if you bestow the same pains and diligent care upon any other sort of Apples, you may frame them to every fashion; for so it is in brief, saith he, that all Apple-fruits may be made to grow up to the shape of any living creature, if you first carve the same shape into a counterfeit of wood or earth, and let the fruit be shut up into that counterfeit, that it may grow up within it. So may you make

A Quince grow in the shape of living Creatures,

as *Democritus* affirmeth, by putting them into some counterfeit that is carved within to the same proportion, and so let the Quince grow in it. But it is easiest to make

Cucumbers grow to any form;

for if you take earthen vessels of any fashion, and therewith cloath the Cucumbers when they are very young, and binde them very fast about, they will receive any shape or impression very easily. If you take a Cane, and make it hollow all along, and bind it fast about, and then put into it a young Cucumber or a young Gourd, it will grow so pliable within it, that it will fill up the whole length of the Cane. *Pliny* saith, Cucumbers grow to any fashion that you would frame them unto; insomuch that you may, if you will, make a Cucumber grow in the shape of a Dragon, winding himself many wayes. Likewise, a Gourd will be made to grow picked and sharp by many means, especially if it be put into a case that is made of such pliant twigs as Vines are bound withal; so that this be done as soon as it hath cast the blossom. But if you lay a Gourd betwixt two platters, or dishes, it will grow to the same plainnesse and roundnesse; and of all other fruit, this is the easiest and fittest to be formed to any fashion. You may make them to grow like a Flagon, or like a Pear, great at the one end, and small at the other, if you tye it hard in that part which you would have to be the lesse: afterward when it is come to full growth, dry it, and take out all that is in it, and when you go abroad, carry it about you, it will

will serve for a cup to drink in. Hence we learn how it may be effected, that

An Almond should grow with an inscription in it.

Take an Almond, and steep it for two or three dayes; and then break the shell of it very charily, that the kernel receive no harm: then you must write in the kernel what you will, but write it as deep in as you safely may: then winde it up in some paper, or some linen cloth, and overlay it with morter, and soil it with dung; and by that device, when the fruit cometh to be of full growth, it will shew you your handy work, as *Africanus* recordeth. So may you make

A Peach to grow with an inscription in it,

as *Democritus* sheweth. After you have eaten the fruit, you must steep the stone of it for two or three dayes, and then open it charily, and when you have opened it, take the kernel that is within the stone, and write upon it what you will, with a brazen pen, but you must not print it too deep, then wrap it up in paper, and so plant it; and the fruit which that will afterward bear, will shew you what was written in the kernel. But

A Fig will grow with an inscription in it,

if you carve any shape upon the bud, the fig will expresse it when it is grown: or else if you carve it into the fig when it is first fashioned: but you must do it either with a wooden pen, or a bone pen, and so your labour shall be sure to take effect. I have printed certain characters upon the rine of a Pomegranate, and of a Quince-pear, having first dipped my pensil in morter; and when the fruit came up to the just magnitude, I found in it the same impressions. Now it remains that we shew how we may

Fashion Mandrakes,

those countetfeit kind of Mandrakes, which couzeners and cony-chatchers carry about, and sell to many instead of true Mandrakes. You must get a great root of Brionie, or wilde Nep, and with a sharp instrument engrave in it a man or a woman, giving either of them their genitories: and then make holes with a puncheon into those places where the hairs are wont to grow, and put into those holes Millet, or some other such thing which may shoot out his roots like the hairs of ones head. And when you have digged a little pit for it in the ground, you must let it lie there, until such time as it shall be covered with a bark, and the roots also be shot forth.

Chap. XIX.

How fruits may be made to be more tender, and beautiful, and goodly to the eye.

NOw at length, that nothing may passe us, we will set down divers kinds of of sleights in husbanding and trimming of herbs and fruits, whereby they may be made not onely tenderer, sweeter, larger, and better relished, but also fresher coloured, and more sightly to the eye. And first

How an Apple-tree and a Myrtle-tree may be bettered,

we may learn out of *Theophrastus*, who counselleth to water their roots with warm water, and promiseth the bettering of the fruit by that means; nay it will cause the Myrtle fruit to be without any kernel at all. And this, saith he, was found out by chance, in certain of these Trees growing neer unto a hot Bath. If you would procure

Goodlier Figs then ordinary,

Columella shews, how you make them to grow more plentifully, and to be a sounder

der fruit. When the tops of the Fig-tree begin to be green with leaves, you must cut off the tops of the boughs with an iron tool; and still as the leaves begin to bud forth, you must take red chalk, and blend it with Lees of oyle and mans dung, and therewithal cover the roots of the Tree: and by this means, the Tree will bear more store of fruit, and besides the fruit will be a fuller and better fruit. *Pliny* and *Palladius* record the same experiment out of the same Author. When the Fig-tree begins to shew her leaves; if you would have it yeeld you more and better fruit, you must cut off the very tops of them when the bud begins to shew it self; or, if not so, yet you must be sure at the least to cut off that top which groweth out of the midst of the Tree. *Palladius* writes, that some have reported, that the

Mulberry tree will bear more and better fruit,

if you bore thorough the stock of the Tree in divers places, and into every hole beat in a wedge; into some of the holes, wedges made of the Turpentine-tree, and into some of them, wedges made of the Mastick-tree. *Didymus* saith that

The Palm, or Date-tree, and the Damosin tree will grow to be of a larger and goodlier assize,

if you take the Lees of old Wine, and after you have strained them, water the roots therewith. And he saith, that it will take the better effect, if you cast upon it a little salt ever now and then. So

The Myrtle-tree will have a goodlier leaf,

and also yield a better fruit, if you plant it among Roses: for the Myrtle-tree delighteth to be consorted with the Rose, and thereby becomes more fruitful, as *Didymus* reporteth. So

Rue will grow tenderer, and more flourishing,

if it be engraffed into a Fig-tree: you must only set it into the bark somewhat neer the root, that you may cover it with the earth, and so you shall have excellent good Rue. *Plutark* in his Symposiakes, commends no Rue but that only which grows very neer the Fig-tree. *Aristotle* in his Problems, demanding the cause of this, at length concludes, that there is such a sympathy and agreement betwixt the Fig-tree and the herb Rue, that Rue never grows so fast, nor flourishes so well, as when it grows under the Fig-tree. If you would have

Artichocks grow without sharp prickles,

Varro saith, that you must take the Artichock seed, and rub it upon a stone, till you have worn it blunt at the top. You may cause also

Lettice to grow tenderer and more spreading,

as *Palladius* shews, and *Columella*. *Palladius* saith, that if your Lettice be somewhat hard, by reason of some fault either in the seed, or place, or season, you must pluck it out of the earth and set it again, and thereby it will wax more tender. *Columella* shews, how you may make it spread broader. Take a little tile-sheard, and lay it upon the middle of the Lettice when it is a little grown up; and the burden or weight of the tile-sheard will make it spread very broad. *Pliny* saith, that it is meet also to besmear the roots with dung when they set them, and as they grow up, to rid away their own earth from them, and to fill up the place with muck. *Florentinus* saith, when you have a Lettice growing that hath been transplanted, you must rid away the earth from the root after it is grown to be a handful long, and then besmear it with some fresh Oxe-dung, and then having cast in earth upon it again, water it; and still as the bud or leafe appears out of the earth, cut it off till it grow up stronger, and then lay upon it a tile-sheard that hath never been seasoned with any pitch, and so you shall have your purpose. By the like device you may procure

En-

Endive to be tenderer and broader.

When it is grown up to a pretty bignesse, then lay a small tile-sheard on the middle of it, and the weight of that will cause the Endive to spread broader. So also you procure

Coleworts to be more tender,

if you bedew them with salt water, as *Theophrastus* writes. The Ægyptians, to make their Coleworts tender, do water them with Nitre and Water mixt together. So

Cucumbers will be tenderer,

if you steep the seeds in milk before you set them, as *Columella* reporteth. If you would have

Leeks to grow Cloven,

the Antients have taught you, that first you must sow them very thick, and so let them alone for a while; but afterward when they are grown, then cut them, and they will grow cloven. Or else, you must cut it about some two moneths after it was set, and never remove it from the own bed, but help it still with water and muck, and you shall have your purpose, as *Palladius* saith. Now we will speak of some monstrous generations; as of the generation of the herb Dragon, and of a cloven Onion. And first

How to produce the herb Dragon.

It is a received opinion amongst Gardeners, that if you take Hemp-seed or Line-seed, and engraffe it into an ordinary Onion, or else into a Sea-onion as it grows neer the Sea, or else into the Radish root, thence will grow the herb Dragon, which is a notable and famous Sallet-herb. But surely, howsoever they boast of it that this hath been oftentimes done, yet I have made sundry trials hereof, and still failed of my purpose. By the like setting of seeds, they shew

How to produce cloven Onions,

by making a hole into an Onion, and putting into it a clove of Garlick, and so planting it; for that will grow to be an Ascalonian, or a cloven Onion. Now let us see, how to make

Parsley to grow frizled or curled.

Theophrastus writes that Parsley will grow frizled, if you pave the ground where you have sowed it, and ram it in with a roller; for then the ground will keep it in so hard, that it it must needs grow double. *Columella* saith; If you would have Parsley to bear curled leaves, you must put your Parsley-seed into a morter, and pown it with a Willow pestle, and when you have so bruised it, wrap it up in linen clouts, and so plant it. You may effect the same also without any such labour; even by rolling a cylinder or roller over it after it is a little grown up, wheresoever or howsoever it is sowed. *Palladius* and *Pliny* record the same experiment out of the same Author. I have often-times seen

Basil growing with a kind of brush like hairs upon it.

The seed of withy-winde being planted neer to Basil, as soon as it shoots up, will presently winde it self round about the stalks of the Basil, and by often winding about them, will wrap them all into one. The like will be effected also, if the withy-winde grow elsewhere, and a twig of it be brought and planted neer to Basil: for by either of these means, the Basil will grow so bushy and so thick of hair, and that in a very short time, that it will be most pleasant to be lookt upon. So you may make the

Ivy to bear very sightly berries,

if you burn three shell-fish, especially of that kind which is called Murex, and when you have powned them together, cast the ashes thereof upon the Ivy-berries;

berries; or else, if you cast upon them beaten Alome, as *Cassianus* teacheth. *Theophrastus* mentions an experiment that is very strange, whereby to make

Cumin grow flourishingly,

and that is by cursing and banning of the seeds when you sow them; and *Pliny* reporteth the same out of *Theophrastus*: and he reporteth it likewise of *Basile*, that it will grow more plentifully and better, if it be sowed with cursing and banning. If you desire to produce long

Cucumbers, and such as are not waterish,

you may effect it by this means. If you take a morter or any other like vessel filled with water, and place it neer the Cucumbers, about five or six inches distant from them, the Cucumbers will reach the vessel within a day or two, and extend themselves to that length; The reason is, because Cucumbers have such a great delight in moisture: so that, if there be no water in the vessel, the Cucumbers will grow backward and crooked. To make them that they shall not be waterish; when you have digged a ditch to plant them in, you must fill it up half full with chaffe, or the twigs of a Vine, and then cover them, and fill up the pit with earth; but you must take heed you do not water them when they are planted. By all these things which have been spoken, we may learn to procure

A Tree, which of it self may yield you the fruit of all Trees.

A thing which I have seen, and in merriment have oft-times called it, the Tree of Garden-dainties. It was a goodly height and thickness, being planted within a vessel fit for such a purpose, the mould which was about it, being very fat, and moist, and fruitful, that so every way, as well by the liveliness and strength of the plant it self, as also by the moistness and thriftiness of the ground, all things that were engraffed into it, received convenient nourishment. It was three-forked; upon one bough or arm, it bare a goodly grape, without any kernels in it, party-coloured, very medicinable; for some of the grapes were good to procure sleep, and other some would make the belly loose. The second bough or arm, carries a Peach, a middle kind of fruit differing both from the ordinary Peach, and the Peach-nut, without any stone in it; and the smaller branches thereof bearing here a Peach, and there a Peach-nut. If at any time there were any stone in the fruit, it was commonly as sweet as an Almond; and it did resemble sometimes the face of a man, sometimes of other living creatures, and sundry other shapes. The third arm carries Cherries, without any stone, sharp, and yet sweet withal, and Oronges also of the same relish. The bark of this Tree was every where beset with flowers and Roses: and the other fruits, all of them greater then ordinary, and sweeter both in taste and in smell, flourishing chiefly in the Spring-time; and they hung upon the Tree, growing even after their own natural season was past: but there was a continual succession of one fruit after another, even all the year long, by certain degrees, so that when one was ripe, there was another budding forth, the branches being never empty, but still clogged with some fruits or other; and the temperateness of the air served every turn so well, that I never beheld a more pleasant and delightful sight.

CHAP. XX.

How divers kinds of fruits, and likewise Wines may be made medicinable.

THE Ancients have been very careful and painful in seeking out, how to mix Wine with divers kinds of Antidotes or preservatives against poison, and how to use it best in such receipts, if need should be. A thing that might very well be practised; for indeed there is nothing more convenient for that purpose. And therefore they have tried and set down more curiously then need required, many things concerning this argument, strang to be reported, & yet easie to be

effected; which *Theophrastus* hath copiously set down. About Heraclia in Arcady, there is a kind of wine, which makes the men that drink of it to become mad, and the women to become barren. And the like *Athenæus* recordeth of that wine which they have in Troas, a place in Greece. And in Thrasus there is a kind of wine which if it be drunk, will procure sleep; and there is another kind of wine made in that sort, that it will cause a man to be watchful: and there are divers confections of wines which you may read of in the most exact Writers of Physick, and of matters of Husbandry, which are easie both to be learned, and also practised by those that are well acquainted with the operations of Simples; and they are such as a mans own conjecture may well lead him unto; and indeed they are nothing else almost, but such qualities operative as the property of the place where their Simples grow, doth endue them withal. And surely I would counsel that these kinds of confections should be ministred to those that are timorous and queazie in the taking of any medicinal receipts, that so they may be swallowed down pleasantly, before they should seem loathsom. And first,

How a Vine may be made to bring forth grapes that shall be medicinal against the biting of venemous beasts.

Florentinus bids you in the first and second book of his Georgicks, to set a Vine-branch, and to cleave it in the lower part about the root, that the cleft may be some four inches long; there you must pluck out the pith, and instead of the pith put Hellebore into it, and binde it fast about with some pliant twig, and so cover it with earth; and by this means it will yeeld you grapes that being eaten, will make your body soluble. Or, if you would have the grapes to be more operative in this kind, you must supple the Vine-branches in some Antidote or counter-poyson, and then set them in the head of a Sea-onion, and so cover them with earth; but you must still poure upon it the juice of that counter-poyson, that the sets may drink their fill of it, and so the strength and vertue of the grape will last a great deal longer. If you would have a Vine to yield the grapes whereof the confections called Propomata are made, *Palladius* shews you. You must take the Vine-branches and put them in a vessel that is half full of Hippocras, or else of Conserves of Roses, or Violets, or worm-wood; and the earth that grows about the root, you must resolve into a kind of Lye as it were made of Ashes; then when the branch that grows up out of the bud beginneth to bear a leaf, you must take it away, & set it as you set other Vines, in any other place, and the fruit will be such a grape as you desire. *Pliny* saith, that if you plant Hellebore about the roots of the Vine, it will yield a grape fit for such a purpose. *Cato* saith, that the herb Scammony hath a wonderful quality in drawing into it self the juice of the Vine. *Pliny* shews

How to make that kind of wine which is called Phthorium, and kills children in their mothers wombes.

That Hellebore which grows in Thassus, as also the wilde Cucumber, as also Scammony, are good to make Phthorian wine, which causeth abortives. But the Scammony or black Hellebore must be engraffed into the Vine. You must pierce the Vine with a wimble, and put in certain withie-boughes, whereby you may binde up unto the Vine the other plants that are engraffed into it: so shall you have a grape full of sundry vertues. So you may procure

Figs that shall be purgative,

if you pown Hellebore and Sea-Lettice together, and cast them upon the Fig-tree roots: or else if you engraffe them into the same roots, for so you shall have Figs that will make the belly loose. *Florentinus* saith, that you may make a Fig to grow which shall be good against the biting of venemous beasts, if you set it after it hath been laid in triacle. So we may procure

Purgative Cucumbers.

You must take the roots of the wilde Cucumber, and pown them, and steep them in fair water two or three dayes; and then water your Cucumbers with that liquor for five dayes together; and do all this five several times. Again, you may make them purgative, if, after they are blossomed, you dig round about their roots, and cast some Hellebore upon them and their branches, and cover them over with earth again. So you may procure

Purgative Gourds,

if you steep the seeds of them in Scammony-water nine dayes before you set them, as the Quintiles report. Now if you would procure a man to be loose bellied and sleepy withal, you may cause

Purgative Damosins that be good also to cause sleep.

You must bore thorough a bough, or through the whole stock of a Damosin-tree, and fill it up with Scammony or the juice of black Poppy wrapt up handsomely in paper, or some such covering: and when the fruit is ripe, it will be operative both for sleep and purgation. *Cato* shews also, how you may cause

A Vine to be purgative.

After the Vintage, at such time as the earth is used to be rid away from the roots of Vines, you must uncover the roots of so many Vines as in your opinion will make wine enough to serve your turn: mark them, and lop them round about, and prune them well. Then pown some Hellebore roots in a morter, and cast them about your Vines, and put unto them some old rotten dung and old ashes, and twice so much earth amongst them, and then cover the Vine-roots with mould, and gather the grapes by themselves. If you would keep the juice of the grape long that it may last you a great while for that purpose, you must take heed, that the juice of no other grapes do come neer it. When you would use it, take a cup full of it, and blend it with water, and drink it before supper, and it will work with you very mildely without any danger at all. Late Writers have taken another course: they rid and cleanse the Vine-roots, and then poure upon the juice of some purgative medicine to water them withal; and this they do for many dayes together, but especially at such time as the bud beginneth to fill out: when they have so done, they cast earth upon the roots again, and they take special regard, that the roots never lie naked and open when the Northern winde bloweth; for that would draw forth and consume the juice of the medicine that is poured upon the roots. This if you diligently perform, you shall have grapes growing upon your Vines, that are very operative for loosing of the belly. I have effected

The same by another means;

I pierced the Vine with a wimble, even unto the very marrow, and put into it certain ointments fit for such an effect: (it will suffice, if you put them within the rine,) and this I did in divers parts of the Vine, here and there about the whole body of the Vine, and that about graffing time by Inoculation; for then the Vine is full of moisture; whereby it cometh to pass, that the moisture it self ascending at that time into the superior parts, doth carry up with it the vertue of the ointments, and conveys it into the fruit, so that the fruit will be operative either for purgation or for childe-bearing, either to hurt or help, either to kill or preserve, according as the nature and quality of the ointment is, which was poured upon the roots of the Vine.

CHAP. XXI.

How to plant Fruits and Vines, that they may yield greatest encrease.

THat we may conclude this whole book, with a notable and much desired experiment, we will now shew in the last place, how we may receive a large encrease

crease from the fruits, and pulse, and Vines which we have planted. A matter surely that must needs be exceeding profitable, for a man to receive an hundred bushels in usury as it were, for one bushel that he hath sowed. Which yet I would not have to be so understood, as if a man should still expect to receive an hundreth for one, precisely or exactly so much; for sometimes the year, or the air and weather, or else the ground, or else the plants may not perform their parts kindly; and in this case, the encreale cannot be so great; (but yet it shall never be so little, but that it shall be five times more then ordinary;) but if those things do perform their parts kindly together, you shall receive sometimes for one bushel, an hundred and fifty by encrease. This may seem a paradox to some, and they will think that we promise impossibilities; but surely if they would consider all things rightly, they should rather think it a paradox, why half a bushel well sown or planted, should not yield two hundred bushels encrease, seeing that one grain or kernel that is planted and takes kindly, doth oft-times spread his root, as we see, and fructifie into sundry and many stems, sometimes into fifteen, and in the ear of every one of those stalks, are contained sometimes threescore grains? I spare to mention here the ground that lies in Byzatium in Africa, whereof *Pliny* speaks, which, for one grain that was planted in it, did yield very neer four hundred stalks, and the Governour of that Country sent unto *Nero* three hundred and fourty stems growing out of one grain. But let us search out the cause whereby this comes to pass. Some think that the encrease commonly falls out to be so little, because the greater part of the fruit which is cast into the ground, is eaten up of worms, or birds, or moles, and of other creatures that live in the earth. But this appears to be false, because one bushel of Pulse being planted, never yields above fifteen. Now the Pulse or Lupines, is of it self so bitter, that none of those devouring creatures will taste of it, but let it lie safe and untouched: and when they are grown up, you shall commonly finde about an hundred grains in the cods of every stalk. Others referre the cause hereof unto the weather, as if the fruit were annoyed with over much cold, or heat, or rain, so that the fields are sometimes frozen with cold, and sometimes parched with heat, whereby they are sometimes more fruitful, and sometimes more barren. But this cannot be the true reason, because that though the weather be never so kindly, ye that cannot make one encrease into thirty. But not to wander or range any further about, we must know that all grains that grow within the ear or the husk, are not prolifical, that is, they are not all fit to yield encrease; for God hath appointed some of them for the food and sustenance of living creatures, and others for seed. There are some grains in an ear, which are as it were abortives, such as degenerate from their natural kind, and will not fructifie at all, but rot and waste away into putrefaction. There are other grains in an ear, such as are easier to be stript out of their husk, which are fitter for propagation, and are better enabled by nature thereunto. Besides that, sometimes it falls out, that seeds or grains are not planted in due season; or if they be, yet sometimes the Husbandman doth not bestow that due labour and industry in looking unto them, which the kind of the fruit requires. Wherefore if we can meet with all these impediments, we may procure encrease according to our hearts desire. For the seeds will be larger in the roots, and when they have spread their roots under the earth of a good length, then will they send up a greater number of stems, and bring forth good store of ears. Therefore you must make choice of your seeds or grains, not of the forwardest, nor yet of the backwardest, because they commonly are weakest, but of the middle sort: then wash them and cleanse them from all other seeds; and besmear them with fat ointments, and with the grease of old Goats; and let them be continually supplied with sufficient heat, and sufficient moisture; then lay them in soft and warm mould carefully manured; for the livelier that the heat of the mould is, the better will the seeds close with it, and become more eager to propagation, and embrace it more sweetly, as the male would do by his female. So shall your your seeds be more enlived, and bring forth a more legitimate and a larger encrease. Let them be planted in

the

the full of the Moon or thereabout; for the larger the Moon is, the more bountiful encreafe fhe will procure. Concerning the Vine, you muft fee that her leaves be not wanting, if you would have good ftore of Wine; for, if the leaves be away, the Vine hath little heart to bear; and befides, fhe fhould be without an iffue for her fuperfluities, which commonly the leaves do receive into themfelves: onely you muft pare off thofe twifted curles that are wont to grow upon it; for fo, her pride being taken away from her, the juice will be more delightful, and more pleafant.

THE

THE FOURTH BOOK OF Natural Magick:

Which teacheth things belonging to House-keeping; how to prepare domestical necessaries with a small cost; and how to keep them when they are procured.

The Proeme.

FRom Animals and Plants, we are come to Houshold-affairs; there we provided diversity of new fruits fit for our use: now we shall seem to have sowed nothing, and produced nothing, unless we shew how, & what we sowed and produced at great charge and pains, may be preserved against the cold, and injuries of the outward air, that they may come forth in their seasons. It were the part of a wicked and slothful man carelesly to let that dye and come to nothing, which he had provided with so much care and pains: wherefore as you were witty to produce them, you must be as diligent to preserve them. And the Husband-man that stores up fruit, shall have good provision for the Winter. For saith Marcus Varro, *they serve for several meats, and no man stores them up but to produce them when he hath need of them, to defend, or use, or sell them. I shall first set down the inventions of our Ancestors, who were very diligent herein, for they found sundry things by divers means, and faithfully delivered the knowledge of them to posterity. Then I shall relate what I know to be true, intermixing some of my own inventions, and such as I think to be of greatest concernment, and that I have often tried. I shall besides add some considerations of bread, wine, and oyle, and such as are of great profit for the Husband-man to provide for his family with the lesser cost, alwayes setting down the natural causes; that they being perfectly known, a man may easily invent and make them. But to proceed to the work.*

Chap. I.

How Fruits may be long preserved upon their Trees.

WE will begin with Fruits: And whereas fruits and flowers both may be preserved either upon their own mother Tree which bear them, or else being pluckt off from it, we will first shew, how fruits may be preserved upon their own Tree, and first rehearse those things which the Ancients have set down concerning this matter, and next, what we our selves have found out by our own experience. Our Ancestors, when they would have fruit to last long upon the Tree, were wont first of all to bind them to the stock or to the boughs, lest any tempest should strike them off, or toss them up and down. Besides, they did intercept that juice from them, which should ripen them: for there are some kinds of fruits, which, as soon as ever they be ripe, will stay no longer upon the Tree, but fall down of themselves, though they are not so much as shaken: other fruits there are that will stick longer and faster to their hold. Besides, they were wont to cover them with certain cases or shells as it were; thereby guarding them from the injuries of the weather, both hot and cold, and also from the mouths of devouring birds. Wherefore to make

Pomegranates hang long upon their Trees;

Some ha e wreathed and platted about the fruit the smaller boughs that grow hard by, that the rain may not come forcibly upon it to break it or chop it, for if it be once bruised, or that it do but gape and have any chops in it, it will soon perish: and when they have so done, they tye them fast to the stronger boughs, that they may not be shaken; and then they bind the Tree about with a kind of broom withes, that the Daws, or Crows, or other birds may not come at the fruit to gnaw it. Some do frame earthen cases fit for the fruit, and cover the same with strawie morter, and let the fruit hang still upon the Tree in them. Others do wrap up every one of the Pomegranates in hay or holm, and then daube it thick over with morter which hath chopt straw in it, and so fasten them to the stronger boughes, that the winde may not shake them. But all these practises must be used when the weather is fair, and there is neither rain nor dew stirring, as *Columella* teacheth. But *Beritius* useth this means to make them stay long on their Tree. He takes the blossoms of the Tree when they begin to wither, and wraps in them every Pomegranate by it self, and then binds them about with bonds; thereby preventing their putrefaction, and their chawns and chops which otherwise would be in them. Others put them in earthen pots every one by it self, and cover them well, and settle them fast, that they may not be broken by knocking against the stock or arms of the Tree, nor by hitting one against the other: for by this means you shall have them alwayes better grown then by any other. *Varro* saith, that if you take Pomegranates before they be ripe, as they stick upon their stalks, and put them into a bottomless pot, and cover them, boughs and all, in the ground, so that no winde may come at them, you shall not only finde them whole when you take them out, but they will be greater also then if they had hung still upon the Tree. *Palladius* shews,

Citrons may be preserved upon the Tree;

even by shutting them up in certain earthen vessels fit for such a purpose; for so you may keep them upon their Tree almost all the year long. If you would have

Grapes hang upon the Vine, fresh and good, even till the Spring of the year,

Beritius prescribes you this course. You must dig a pit in a very shadowy place neer to the Vines, about a yard deep, and fill it up with sand, and set up some props in it: then you must loosen the joints of the Vine-branches, and winde them in together with the clusters of grapes to be tied to the props, and then cover them, that no water may come at them. You must take heed also that the grapes do not touch the ground. A thing which I have oft-times put in practise, but it fell not out to my expectation: for still the grapes were half rotten, and their colour quite faded. *Columella* saith, There is no surer way then to prepare certain earthen vessels which may hold each of them a cluster of grapes, so that they may have scope enough; and they must have every one four handles, whereby they may be tied to the Vine, and their lids or coverings must be so framed that the middle may be the place of closing, where both sides of the cover may fall close together when the clusters are in, and so meeting may hide the grapes. But you must see that both the vessels themselves, and also their coverings be well pitched both within and without; for the pitch will do good service herein. When you have thus covered and shut up your grapes, then you must lay good store of morter with straw chopt in it upon the vessels. But in any case, look that the grapes be so placed in the vessels, that they touch no part thereof. *Tarentinus* gives this counsel. The clusters that first grow, you must pluck off, and then others will come up in their steads, if you look carefully to the Vine: now these later clusters will be very backward and long ere they be ripe: take some earthen vessels, and let them be somewhat open below: put into them your later clusters, and let the upper part of them be very close covered, and then bind your vessels fast unto the Vine, that so the wind may not shake them. *Palladius* saith; If you be desirous to keep grapes upon the Vine till the

the Spring-time, you must take this course. Neer unto a Vine that is laden with grapes, you must make a ditch about three foot deep and two foot broad in a very shadowy place; and when you have cast sand into it, stick up certain props, and winde the bunches daily towards them, and when you have wrought them to stand that way, bind them to your props without hurting the grapes, and then cover them to keep them from the rain. The Græcians likewise counsel you to shut up your grapes into certain earthen vessels which are somewhat open beneath, but very close and fast shut above, and so you may preserve them long upon the Tree. If you would preserve

Grapes upon the Vine till new come again, so that upon one and the same Vine-branch, may be seen o'd and new grapes both together,

you may effect it by this device, which I my self have used: for, all the former experiments are the inventions of Antiquity, and, because there is great difficulty in working them, and small profit when they are wrought, therefore I esteem them as toyes and matters of little worth. But this I have experienced my self, and preserved good grapes upon a Vine until May and June, and so have seen both new grapes, and grapes also of the former year together upon one and the same branch. When Vintage time is past, you must take the tops and pliant twigs of such Vines as grow by the house side, and winde them in at the window into the house, and binde them fast to the summers or beams with the sprigs of Broom, as with strings or thongs, that they may be surely stayed from wagging up and down: but you must let them in handsomely that the windows may be opened and shut conveniently. By this means you shall keep them safe from the injury both of the cold weather, and also of the devouring birds. When there is any frosts or winds abroad, keep the windows close shut, and open them again when the air is waxed any thing calm and warm; and so deal by them till the Spring come. And when the Vine begins to bear new buds and new leaves, then let your twigs out of prison, and bring them back again into the open air, and there let them take the comfort of the warm Sun. So shall there grow new grapes upon the same twigs where the old grapes are. I have also effected the same

By another means.

Because it was a great trouble, and a very irksome piece of work, to take that course every year, I have thought of another device whereby the same effect may be attained both more prettily and miraculously. About the time wherein they are wont to prune Vines, make choice of two special branches upon the Vine, such as are most likely to bear fruit. Cut off the tops of either of them, but leave the branches still growing upon the Vine, and leave two or three buds upon either branch. Then take a vessel made of chalk or white clay, and let there be a hole bored quite thorough the bottom of it, and so place it, that it may stand fit for the branches to be drawn thorough it, so that they may stand a little out above the brims thereof. When your branches are so seated, then fill up the vessel with earth; and, that you may work more surely and speedily too, you must set over your earthen vessel another vessel full of water, all the Summer long, which must be stopt toward the bottom with a clout somewhat loosely, that the clouts end hanging down into the earthen vessel, may bedew the earth that is in it continually by little and little; so shall your sprigs or branches bring forth both fruit and leaves, and moreover shall take root within the vessel that will shoot out into new twigs. After Vintage-time, cut off the branches from the Vine a little beneath the earthen vessel, and so carry them into a close house that is situate in a dry place where no tempests can come at it, as in Wine-cellars, or such like: Let the windows be netted over, that the birds may not come at them: In the Winter-time, if there come any fair dayes, bring them forth into the Sun; and, when the weather is extream cold, keep them in so much the closer and warmer rooms. If you preserve them thus until August, you shall have old and new grapes both together upon one branch, and each of them will be quick and well-coloured.

CHAP. II.

How Flowers may be preserved upon their own stalk.

By the like devices as those were, we may also preserve flowers upon their own stalk; yet not so easily as fruits may be preserved upon their own Trees: Neither yet can they be made to last so long as fruits, because fruits are of an harder substance, but flowers are soft and tender. First therefore we will shew

How Roses may be preserved upon their own stalks.

If you take a Reed or Cane, and cleave it when it is green as it grows by the Roses, and put in the Rose-bud as it is upon the stalk, within the Reed, and then binde some paper about the Reed somewhat loosely, that it may have as it were a breathing place; your Roses will thereby be well preserved upon their stalk, as *Dydimus* reporteth. *Palladius* saith; If you shut up your Rose-buds as they grow upon their stalk, into a growing Reed which you have cleft for that purpose, and close up the Reed again, that the cleft do not gape, you shall have fresh Roses when you will, if you open your Reed again. I have tried this device, and found it in some sort to be true, and answerable to my intendment: I took the Rose-buds before they were blown, and shut them up into a Reed (for the Roses and the Reeds must be planted neer together) and the cleft which I had made in the Reed, being but slender, I bound it up again that it might not stand gaping, (onely I left a fit passage for the Rose stalk to stand in) and so I preserved them a great while. The like device I used

To preserve Lillies upon their stalks for a long time.

I cleft the Cane betwixt the joints, and put the Lillies into it as they grow upon their stalk before they were blown, and so the joint of the Cane closing upon them beneath, and the cleft above being stopt with wax, the Lillies were thereby long preserved upon their stalk. The very same experiment I practised upon Clove-gilliflowers, and so I had them growing upon their stalk a great while: And whensoever I would use them, I brake up their cases wherein they were preserved, and so by the comfort and force of the Sun, they were blown and opened themselves.

CHAP. III.

How to make Fruit safes, or places wherein fruits may conveniently be preserved.

Now we will shew how you may preserve fruits when they are taken off from the Trees whereon they grow. Wherein because our chiefest care and labour is, to keep them from putrefaction, therefore, that we may so do, we must first know the causes of their putrefaction. The Philosophers hold, that the temperature of the air being of it self exceeding variable by reason of the variety of celestial influences which work upon it, is also of that force, that it causeth every thing which it cometh at, even whatsoever is contained under the cope of the Moon, to hasten towards an end, and by little and little to decay continually. For the air which is apt to search every thing when it lights upon any fruit, finds in it a certain natural heat somewhat like to its own heat; and presently closes with it, and entices as it were the heat of the fruit to come into the air: and the fruit it self, having a natural coldness as well as heat, is very well content to entertain the heat of the circumstant air, which exhausteth the own heat of the fruit, and devoureth the moisture of it, and so the fruit shrinks, and withereth, and consumes away. But man is not of such a dull sense, and of such a blockish wit, but that he can tell how to prevent these inconveniences, and to devise sundry kinds of means, whereby the soundnesse of Fruits may be maintained against the harms and dangers both of cold, and of heat. And first we will

speak of Fruit-safes, or artificial places, whereby the danger of heat may be avoided. Then we will shew that there is especial choice to be made of times, wherein heat shall be of small force. And then we will prescribe the manner of gathering fruits, lest happily they might be bruised with handling or falling, which if they should, it would be their bane, and the beginning of their putrefaction. And last of all, we will teach you how to lay them up in divers and sundry places, whereby you may prevent the heat and moisture of the air, from doing them any harm. First therefore, that we may prepare cold and dry places, wherein we may lay up such fruits as we would have to last long, and so to keep away the extrinsecal heat and moisture, we must understand that there are places, some general, and some particular. We will speak of some peculiar places of the world, which are excellent good to preserve fruits in. *Theophrastus* saith, that some fruits will last the longer, because they are laid up in some certain places. Wherefore, in a certain place of Cappadocia, which is called Petra, fruits may be preserved fourty years, and yet they are all that time fertile, and very fit to be sown: nay, saith he, if they be kept threescore years, or threescore and ten, they will still be very good for meat to be eaten, though not so good for seed to be sown. The place he reports to be a high place, and open for the winds, and to stand lower towards the North then to the other three quarters of the world. It is reported likewise, that fruits are preserved in Media, and other high Countries, longer and better then in other places. But these are the properties of some peculiar places onely. But generally for all Fruit-safes, it is the judgement and counsel of all the best and learnedst Husbandmen, that they must be so situate, that they may have windows towards the North, which must lye open in the Spring-time, and every fair day, that the Northern wind may blow into them. But in any case there must no windows be made towards the South, because the Southern winde will make your fruit full of wrinkles. Let us see therefore

What places are fittest to lay up Quinces in.

Marcus Varro saith, that they will be preserved well if they be laid up in some place that is cold and dry. *Columella* also layes them up in a cold floor or loft where there cometh no moisture. *Palladius* likewise would have them laid up in some cold and dry place, where there cometh no winde. So if you would

preserve Apples well,

Columella teaches you to lay them up in a very cold and a very dry loft, where neither smoak, nor any noisome savour can come at them. *Palladius* would have them laid up in some close and dark places, where the winde cannot come at them. And *Pliny* would have them laid very thin one by another, that so the air may come equally at every side of them. So

Pomegranates may be preserved,

as *Columella* reporteth out of *Mago* the Carthaginian, if first you warm them in Seawater, and then besmear them with some chalk, and when they be dry, hang them up in some cold place. And *Palladius* out of *Columella*, prescribes the very same course. In like manner you may

Preserve the fruit called Ziziphum,

if you hang them up in a dry place, as the same Author is of opinion. If you would have

Figs to last a great while,

Columella teacheth you, that as soon as they be thoroughly dry, you must lay them up in a very dry room, and thereby you shall preserve them for a long time. So

Damosins may be long preserved,

If you lay them upon hurdles or grates in some dry place, where the Sun may come at them. *Palladius* shews, that

Chest-nuts may be long preserved,

if they be raked up in the earth, where they may lie dry. And I my self have seen in Barry;

Almonds preserved sound a great while,

three years or four years together, shells and all, being laid up in a dry place. If you would have

Wheat long preserved;

Varro saith, that you must lay it up in high Garners which have a thorough air on the East-side and on the North-side: But in any case there must no moist air come at them from any waterish places thereabouts. Some have their Garners under the ground, as Caves, as it is in Cappadocia and Thracia; others have their Garners in pits and ditches, as it is in the neerer part of Spain: only they lay the chaffe under it, and take special care that no moisture nor air may come at it, except it be when they take it out to use some of it: for if the air be kept from it, the worm cannot breed in it to devour it. By this means they keep their wheat good and sweet, fifty years; and they preserve their Millet above an hundred years, as *Theophrastus* recordeth. If you lay up your wheat with any dust in it, it will putrifie: for the extrinsecal heat of the dust, doth as it were lay siege to the natural heat of the grain, and so choaks it up, because it hath not as it were a breathing place; and by this means it is over-heated, and so putrifies. *Florentinus* reporteth out of *Varro*, that Corn may be very well preserved above ground, if it be laid up in such places, as have the Eastern light shining into them: they must also be so situate that the Northern and the Western winds may come at them moderately; but they must be safe from all Southerly winds: and you must make in them a great many of channels, whereby both the warm vapours may have issue forth, and also the cooling air may have access in. The best way whereby you may

Preserve Beans,

is, to parch them reasonably well; for so there will be less store of moisture in them, which will cause them to last the longer. *Theophrastus* writes, that in Apollonia and Tarentum, they preserve Beans long without any parching at all. *Pliny* makes mention of certain Beans that were laid up in a certain Cave in Ambracia, which lasted from the time of King *Pyrrhus*, until the war which *Pompey* the great waged against the Pirates. The same *Theophrastus* writes also, that

Pease may be long preserved,

if you lay them up in high places where the wind hath his full force, as in Media and the like Countries: but the Bean will be kept there much longer. So also the

Pulse called Lupines, may be long preserved,

if you lay them up in a loft where the smoak may come at them, as *Columella* writeth: for if any moisture do settle upon them, presently the worm breeds in them; and if once the worm have eaten out the navel as it were of the Pulse, that which is in them like a little mouth, then cannot the other part which is left, be ever fit for seed. *Palladius* likewise saith, that this kind of Pulse will last very long, if it be laid up in dry Garners, where no moisture can come at it; especially if it may be continually perfumed as it were with smoak. But now let us shew how to do that which is the most difficult thing of all in this kind, namely,

How to preserve flesh and fish,

I have seen flesh and fish preserved from putrefaction, for a whole moneth together

ther in very cold places, without any other art at all besides the coldness of the place. In rooms that are made under the ground, and very cold, where there cometh neither heat nor any Southerly winde, but that they are continually cold and dry, almost every thing may be preserved without putrefaction. In a certain monastery that is upon the Hill Parthenius, neer unto Naples, I saw the carcases of men kept whole and sound for many years together. The Hill is covered over with snow almost continually: and in the tops of the Mountains, where the snow lies in ditches and pits, conveyed thither of purpose to keep it, look what Pears, and Cervices, and Apples, and wilde Chest-nuts have been gathered up by chance together with the snow, and put into the same pits; after the space of a year that the snow was consumed away, we have there found the same fruits, so moist, and fresh, and goodly to the eye, as if they had been but then pluckt off from their Trees. To conclude, there is nothing better and more available for the preservation of any thing, then is the dryness and the coldness of such places as they are laid up in, to be kept.

Chap. IV.

What special time there must be chosen for the gathering of such fruits, as you mean to lay up in store for a great while after.

THe principal matter which I would have to be observed in this case, is the choosing of your time wherein to gather all such fruits as you would lay up in store, that they might last long. For if we desire to defeat that heat and moisture which will mar our fruit, and cause it to putrifie, we cannot take any better course against them, then by making choice of such a time to gather our fruits in, as when those planets and stars, which are the principal Authors of that heat & moisture, are themselves become cold and dry, or at the least not hot and moist in any high degree. The Moon when she is in the waining, is cold and dry: If there be any fruits gathered when the Moon aboundeth with heat and moisture, the very same qualities will also the fruit abound withal, and so they will very soon be putrified, as every man of any wit will easily judge: and therefore all those that have written of Husbandry, with one consent do give it for a precept, that fruits are to be gathered in the decaying of the Moon. Moreover, the night and the day, the morning and the evening, do bestow their moisture and their dryness upon fruits, accordingly as they themselves are either moist or dry. The day, by reason of the presence of the Sun, is hot and dry. The night, by reason of the absence of the Sun, is cold and moist: The evening, by reason that it hath a little of the Sun, is partly warm; and yet withal by reason of the approaching night, is partly moist: The morning, is partly cold, by reason of the tail of the night; and partly warm, by reason of the Sun approaching: So then, let two or three hours of the day be spent, and then the time will be somewhat dry, because it hath begun to be a little acquainted with the Sun; and withal somewhat cold, because it hath not yet quite forgotten and shaked off the night; and this is in all mens judgement the best and the fittest time wherein to gather fruits. But least we should make the matter too hard and difficult, by giving such Astrological precepts, we will frame our selves to the plainest, and yet a very exact rule; namely, that the situation and aspect of the Planets is to be regarded, whereby the air becometh colder and dryer then at other times, and so consequently the fruit may last the longer. And, because we will not be too tedious, we will spare to alledge authorities and experiments which might be brought for the proof hereof, seeing all living creatures that are gendred in the full of the Moon, or somewhat before, do grow much more then they that are gendred when she is in the waining. But let us come to examples. If you would know

The time, wherein Citrons are to be gathered,

Palladius teaches you in his book of the preserving of Citrons. If you would gather Citrons to keep, saith he, you must pluck them with their boughs and leaves from the

the Tree in the night time, when there is no Moon-light stirring. *Pontanus* a Country-man of ours hath elegantly set down this matter. If you desire, saith he, to keep Citrons long without any harm or loss of their vigor, you must take this course: Pluck off the fruit together with the branches & leaves as they were upon the Tree, in the night time when the Moon shines not at all: Then hang them up upon some hook or tack in some dark and close place; see that you touch them but very softly, and let not any winde come at them; or else lay them up amongst chaffe and dry straw; So shall you keep the fruit sound and good, and the leaves also green for a great while together. There is also

An appointed time wherein Quince-pears are to be gathered.

I have found no better or surer way to preserve Quince-pears, saith *Columella*, then by gathering them that were very ripe and sound, and without any blemish, at such time as the air was temperate, and the Moon in the waining. Likewise the same Author prescribing unto us

A time wherein Apples are to be gathered that they may last the longer,

biddeth us to do thus. About August, choose, saith he, the sweetest Apples, such as be not over ripe, and they will be kept long. *Pliny* counselleth us to gather them after the Æquinoctial in Autumne, but never before the Moon be fifteen dayes old, nor yet before one of the clock. And *Palladius* shews,

What time Pears are to be gathered in, that they may last long.

In a calm day, when the Moon is in the waining, and that also toward the latter end, betwixt the two and twenty and eight and twenty day of the Moon, you must take them off the Tree with your hand, at such time of the day as the Sun is in some strength of heat, that is, either betwixt seven and ten in the morning, or else betwixt two and five of the clock in the after-noon: and the Pears which you so gather, must be somewhat hard and green. *Pamphilus* an Husband-man prescribes

A certain time wherein to gather Cherries, that they may last long,

Cherries are a kinde of fruit that will soon wither; and yet if you gather them before the rising of the Sun, and so lay them up, they will be fresh and good a great while. *Palladius* prescribes

A certain time wherein to gather Medlars, that they may last long.

They are to be gathered, saith he, in a fair day about Noon-tide; and they must not be thorough ripe. *Columella* saith, that

The time wherein you gather Pomegranates to be laid up and preserved,

must be a fair day when the air is temperate. *Pliny* would have you to let them be well dryed in the Sun, that there be none of the nights dew left upon them. *Didymus* chooseth

A certain time wherein Grapes are to be gathered, that they may last long.

If you would lay up Grapes that they may last all the Winter long, you must, saith he, gather them after the full of the Moon, when the air is clear and calm, about four of the clock after-noon, when all the dew is quite dryed off from them: you must gather them when they be at the best, even in their full strength, so that they be neither raw, nor yet past their ripest strength. Authors likewise do prescribe

A certain time wherein Corn is to be gathered and laid up.

When you have reaped your Wheat or Barley, you must let it lye abroad in the field one or two dayes, or at the least one whole night, and carry it away before the rising of the Sun, that so it may be throughly cold when it is laid into the barn; for

for it is that which will cause the Corn to last much the longer. *Columella* shews, and he teaches it of his own experience

What time Beans are to be gathered, and layed up to be long preserved,

You must fell your Beans, saith he, when the Moon is in the very last of her last quarter, and you must fell them before Day-light; then, when they are waxed dry upon the floor, presently you must thresh them out before the Moon is renewed; and when you have laid them on cooling, then carry them into your Garner to be laid up: for if you deal thus with them, you shall be sure to preserve them from the worms, which otherwise will breed in them. The very same experiment doth *Palladius* record out of the very same Author. Likewise

Garden Pease may be preserved for a whole year;

if you lay them on drying in the Sun, and when you have fetched out all their moisture, take them out of their shells, and lay them up: for by this means shall you preserve them from putrefaction.

Chap. V.

Of the manner how to gather fruits; as also how to help and dresse the stalk that grows into them, whereby we may prevent the first original, and the occasion of their putrefaction.

WHereas our Ancestors did perceive that the first beginning of putrefaction in fruits did arise from the little stalk that grows into them, or from that part of the fruit where the stalk is entertained into it; (for it is requisite, that the beginning of the spoil, and destruction of them should arise in the very same part, wherein they began first to live and receive their nourishment) they have therefore devised sundry means whereby to prevent all such mischief and harm, as the stalk might bring upon the fruit, Moreover, fruits are very carefully to be gathered, especially those which we would lay up for store, that they be not knockt and hit one against the other; for the hitting of them together will cause their putrefaction. Besides, we must see that they be in their best estate when we gather them, that they be not perfectly ripe; for as they must not be altogether sharp and green when they are gathered, so neither must they be come to their full ripenesse. Furthermore, the fruits that you would lay up, you must take a diligent view of them, and see that they be sound, without any bruise, or speckednesse, or worm in them. But let come to examples. And first

How we must gather Apples, and how we must dress their stalks.

Columella would have such Apples to be preserved, which have a good relish, and are gathered when they are reasonable ripe: and he would have them to be so disposed and placed when they are laid up, that the blossome-end should stand upward, and the stalk-end downward, even so as they grow upon the Tree: but they must not be laid to touch one another; neither must they be thoroughly ripe when they are gathered, but somewhat sharp and sowre. Besides, you must see that every several kind of Apples must be laid up in a several room or cell by themselves: for when sundry kinds are laid together in one cell, there will be a disagreement amongst them, and so they will the sooner putrifie. Experience whereof we have in wine; which if it be made of sundry kinds of grapes, it will not be so durable, as when it is made onely of one kinde. *Palladius* saith, If you keep Apples in store, you must gather them very charily, that they be taken off from the Tree without any blemish; and you must drench their stalks in scalding pitch, and so place them upon a boarded loft, with the stalk-end downward; and you must take heed that you do not touch them, nor meddle with them till we take them out as being fit for our use. *Pliny* likewise sheweth, that Apples must be placed upon their stalk-ends. *Apuleius* the Greek counselleth us to gather our Apples when they are in their full strength;

and we must take special regard, that they be gathered by hand without any bruise; and then laid up in such sort that they may not touch one another: but in any case they must be sound, and not thoroughly ripe. He saith moreover, that if you besmear the tops of the Apples with the juice of green Rag-wort, it will preserve them from putrefaction. If you would have

Citrons to last long,

Palladius counselleth you to gather them with their boughs which they grow upon, and lay them up in several, as we shewed before out of *Pontanus*. *Columella* shews

How Pears must be gathered that they may endure long;

namely, if you gather them before they be thoroughly ripe: and *Palladius* saith, that they must be gathered charily by hand, that they may not be bruised; and you must diligently cull out from them, all such as have fallen from the Tree, and lay up none but those that are very sound, and somewhat hard and green, and such as are gathered with their stalks upon them. *Democritus* saith that those Pears will keep best, which are besmeared with pitch about the stalk, and so hung up. We will also shew the manner how to gather;

Cervices, that they may last.

Marcus Varro saith that Cervises are to be gathered even while they are very sowre, and so to be hung up, that they may ripen but slowly, and that also within doors: for if you lay them up when they are grown to some ripenesse, they will not last so long. *Theophrastus* by this means procured Cervices to defer their ripening even until Winter. *Columella* saith, they must be charily gathered with your hand. *Pliny* saith, they must be hanged up as they are upon their boughs. *Palladius* saith, they must be gathered when they are hard, and so hanged up together with their stalks in some close and dark place. So

Figs are to be laid up as they are upon their boughs,

as *Africanus* teaches; but, saith he, they must be gathered before they be ripe: for when once they are come to be ripe, they will hang no longer upon their Tree, as other fruits do, but fall off presently. They are also to be gathered and laid up with their stalk or their navel upon them, that is, the part which they hold by, and depend upon their mother: for if they be so gathered, they will last the longer sound and good. *Palladius* also would have them to be gathered while they be green and unripe, and that with their stalks upon them, and so to be laid up. *Cato* saith, that the boughs of the Fig-tree whereon the figs grow, are to be preserved together with their fruit; and those figs that you would keep, must be gathered somewhat green and sowre. *Columella* saith, that Figs, if we would keep them long, must be gathered, neither when they are very ripe, nor yet when they are too green. *Palladius* saith, that if you would have

Peaches well kept,

you must fill up the navel of the Peach, that is, that part of the Peach whereby it closeth with the stalk, with one drop of scalding pitch. I for my part have preserved

Damosins a great while together,

by hanging them up with their stalks, upon the rafters of an house; but there is none so good to be kept, as those that are of a purple colour. *Palladius* would have them to be gathered while they are unripe, yet he would not have them too raw; but in any case they must be very sound, and without any worm, or bruise, or any other blemish. So also the fruit called

Ziziphum may be preserved,

if

if it be gathered with the boughs that it grows upon, and folded or wrapt up in his own leaves, and so hung upon the beams of an house, as *Palladius* sheweth. So

Medlars may be kept long,

if you gather them when they are but half-ripe, and hang them up with their boughs in some house. *Beritius* shews,

How Pomegranates are to be gathered and laid up to last.

You must gather them, saith he, with a very chary hand, lest if you touch them somewhat roughly, they should be hurt or bruised; and that would be an occasion of their putrefaction. *Columella* saith, that Pomegranates are to be gathered with their stalks, and the stalks to be put into an Elder-tree; because the Elder-tree is so full of pith, that it may easily entertain the Pomegranate stalks. The same Author reports out of *Mago* the Carthaginian, that all fruits, which you would lay up in store, must be gathered with their stalks upon them; yea, and if it may be without the spoil or hurt of the Tree, they must be gathered with their boughs too; for this will be very helpful to cause the fruit to last the longer. *Palladius* saith, that Pomegranates may be preserved best, if you gather them sound, and lay pitch upon their stalks, and hang them up in due order: nay, they will keep so much the better, the longer the boughs are, which are pluckt off from the Tree with them. *Pliny* saith, that they are to be gathered with their boughs, and the boughs to be stuck into the Elder pith, and so to be preserved. *Cato* shews, how we may preserve

Myrtle twigs with their berries upon them.

They must be taken from the Tree when the berries are somewhat sowre, and so bound up with their leaves about them. *Didymus* hath taught us, how we must gather

Grapes that they may last long.

We must take special heed that every grape be perfect and sound; and for this cause we must have a very sharp knife or hook, to cut of those grapes that are unsound easily and without any stroke, even with one touch as it were. When you gather your grapes, they must be in their full strength, neither too raw, nor yet past their best livelines. Some cut off the branches together with the clusters; and when they have so done, they espy out all the grapes that are either putrified, or dryed away, or unripe, and pluck them off with a pair of nippers, lest they should infect their fellows; and after this, they take the branches whereon the clusters grow, and that end which was cut, they dip into scalding pitch, every one by it self. Others hold, that grapes must be hanged up in some high roof, where the air may have full scope at them; but the grapes must be none of those which grow toward the tops of the branches, but they must be the lower clusters. *Palladius* saith; If we would have grapes to last, we must see that we gather such as are without blemish; they must not be too harsh and sowre, neither must they be over-ripe, but it must be a very clear grape to the eye, and somewhat soft to be felt, and yet it must have a reasonable tough skin. If there be any amongst them that is bruised, or hath any other blemish, we must cut it way; neither must we suffer amongst them any one that is over hard, which the Sun hath not in some sort overcome with his heat: After all this, we must drench the cut ends of the stalks in scalding pitch, and so hang them up.

CHAP. VI.

In what grounds those fruits should grow and be gathered, which we would lay up.

WE must not omit to speak of another necessary observation in this matter; namely, in what ground, in what air, under what Climate, it is best that those fruits, which we should lay up, should grow and be gathered. Whatsoever fruits do grow in moist and waterish, in hollow and low grounds; as also those which grow in such grounds as are much soiled and manured with fat muck; they are much subject to putrefaction; for, in as much as they grow with great store of moisture and heat in them, they have the occasion and original of their own bane within their own bosome. But in wilde fruits, and such as grow upon the tops of mountains, in dry grounds, and such as are not manured at all, and such as the Southern heat doth continually beat upon, it falleth out clean otherwise: for the fruits that grow in such places, are for the most part, dry, and very solide, not abounding either with heat or moisture. *Hesiodus* in his book of Husbandry, never makes any mention of muck or soiling, and questionless, he would never have omitted such a necessary part of Husbandry as this is, but that he saw the inconvenience of it in this respect, that it makes the fruit more subject to putrefaction, and many infirmities. Fruits that grow in wilde and stony grounds, where the winde hath his full force, will preserve themselves without any skill and device practised upon them: wherefore, if other sleights be added, which are helpful to their preservation, they will surely last much the longer. But let us see whether Antiquity hath made any mention of this matter; and first let us hearken to *Theophrastus*, who shews

In what ground there grow the best Dates or Palms to be preserved for store.

If you preserve and lay up any Dates or Palms, saith he, you must make choice of those which grow in sandy grounds, as in that Country which is called Syria cava: and there are in all that Country but three sandy places where they do grow, and these are excellent good to be preserved; those which grow in other places, are not durable, but presently wax rotten. Of all those Palms which Syria yeelds, it is held by some, that none are good to last, but those only which grow in the Palme-valley, a place so called there. But those which grow in Ægypt, and Cyprus, and elsewhere, they are all very soon putrified. And *Pliny* reports out of the same Author, that those Palms which grow in salt and sandy grounds, as in Judæa, and Cyrenian Africa, may be preserved: but not those which grow in Cyprus, Ægypt, Syria, and Seleucia of Assyria. The same *Theophrastus* speaking of Beans, shews

In what ground there grow the best Beans to be preserved for store.

One Country, saith he, differs from another, and one Climate differs also from another, in respect of the fruits that grow in them, either to be good to lay up, or to be subject to putrefaction. And therefore the Beans that grow in Apollonia which is neer to the Ionian Sea, are not subject at all to any worms or rottennesse, so that they are best of all other to be preserved. Likewise the Beans that grow about Cizicum are very durable.

CHAP. VII.

How fruits must be shut up and kept close that the air come not at them.

WE have shewed before, that, if we would preserve fruit long, we must keep away both heat and moisture from them; both which qualities are found in the

the air. Wherefore we will first set down the devices of Antiquity in this behalf, and then our own devices and experiments. And first

How to keep Apples close without putrifying.

We will begin with *Aristotle*, who saith, that fruits are to be kept in bottles full of air, that so the extrinsecal air may be excluded; for thus he speaks in his Problems. Whence cometh it, that the fruits of Trees, and flesh, and such like, do last without putrefaction, when they are shut up in bottles full of air, or in other vessels that are well covered, and closed up on every side? It is because all things are wont to be corrupted when they are stirred or removed, but when things are filled, they stand unmoveable? for it cannot be, that any thing should be moved, unless there be some vacant space to be moved in: now those things which are so shut up, are every way full, and therefore are preserved without corruption. As if he should say; the air which is so enclosed, cannot so soon procure putrefaction, by reason that it is not so subject to the daily alterations of the circumstant air. Or, if the fruit could send forth their heat and moisture which is in them, yet it should be kept in upon them by the fulness of the bottles. But let us see what the Masters of Husbandry do teach concerning this matter. As for example

How to preserve Citrons close without putrifying.

Palladius doth thus preserve them from the air. He shuts up every Citron in a several vessel by it self, and plaisters them up, and sets them orderly in a fit place prepared for that purpose. *Sotion* saith, that the Pome-Citron must be very well plaistered over with stampt morter, that so it may keep one whole year together, without any harm or blemish. So have others taught us the way

How to keep Apples shut up close.

Columella saith, that every several kind of Apples is to be placed in a several cell by themselves; for when divers kinds are shut up in one and the same cell, they will not agree so well together, but will soon putrifie: But when you have disposed of your Apples that they are set in good order, then shut up the lids of the coffer or cell upon them; and plaister the lids over with lome, that hath straw chopt in it, lest the air get in. *Palladius* would have every apple placed by it self in a several earthen vessel, which must be pitched within, and plaistered over with morter, or else they may be lapt up in clay, and so preserved. *Pliny* saith, that the custom in his time was, to make choice of the goodliest apples, and to plaister them over with morter or wax, that it may be like a crust upon them: but, saith he, they must be fully ripe first; for otherwise they will grow and wax bigger, and so break out of their houses. Others put every several Apple or Pear into a several earthen vessel, and besmear the vessels all over with pitch, and then put the vessels with the fruit in them, into a barrel or tub, and so preserve them. *Apuleius* was wont to preserve them in an earthen pot laid all about on the inside with wax. Some preserve them by lapping them up in Reits or Sea-weed, and so shutting them up into earthen pitchers: but they must be every one wrapt up severally by it self, and so laid, that they may not touch each other; and besides, the pitchers must be very well and close covered. *Columella* prescribes this course whereby

Quinces are to be shut up, that they may last.

They must be wrapt up in Fig-leaves; and you must take some Potters white earth and put in Wine-lees to it, to make morter of them, and with that morter besmear the Quinces: then you must put them into some new vessels, and cover them all over with some dry plaistering that they may not touch one another. *Palladius* puts them between two tile-sheards, and closes them up, with Lome round about; and then covers them over with dry plaistering, and so

 laies

layes them up in a New pot or basen, that they may be kept asunder. *Democritus* doth first cover them over with leaves, and then he makes morter of clay or of some Potters chalk with hair chopt into it, wherewith he besmears the Quinces; and when he hath dryed them in the Sun, he layes them up: and whensoever he would use any of them, he breaks up their case, and there finds his Quinces in the same taking as they were, when he put them in. But *Pliny* teacheth us very briefly, that if we would keep Quinces long, we must shut them up so close, that no air may come at them. By the like means, you may preserve

All things close exceeding well,

Mago, when he would preserve any fruit close, he covers them all over very carefully with Potters chalk, and then dries it in the Sun; and if there happen to be any chap in the mould, he stoppeth it up with lome, and so when it is drie, layes it up. Others take a new earthen pitcher, and strew it with the dust or shavings of Poplar, or else of the Holm-tree; and then they place the fruit in it, in such sort that there lies some of the dust betwixt every fruit: then they boord that space, and make a floor over that stoary; and having so done, they strew the second stoary with the like dust, and there also dispose of their fruit as in the other stoary: then they boord that space too, and make a third stoary, and so a fourth, and so forward till the pitcher be filled up: and when it is full, they lay a covering upon it, and plaister it over very carefully with thick lome. Others put their fruit into a barrel, but they place them in such order, that the one may not touch the other; and then they close up the barrel again, as *Palladius* reporteth. *Africanus* teacheth a way whereby

Figs may be shut up to be preserved long,

You must take a green Gourd, and make in it certain cells or hollow places of receipt, for every several fig a several cell; Into these cells you must put your figs, and wrap the gourd about with a swathe of cloath or leather, and then hang up the gourd in a dark place where neither fire nor smoak may come at them: But you must see that the figs which you would thus preserve, have their tails ar stalks upon them. Others take a cup of glasse, or some other cup that you may see thorough, and set it upon the figs with the mouth downward, and stop up with wax every place round about, that no air may come within the cups mouth; and so the figs are preserved without any corruption. *Palladius* rehearseth the very same experiment out of the same Author, Likewise

Cervises may be shut up in barrels,

and thereby be preserved a great while. You must take Cervices presently as they are gathered, and make choice of those that are not bruised nor blemished any way: These you must put into a barrel, and shut up the mouth of the barrel very close, and plaister it over with morter. Or else you may take clay-morter, that is well made, and beaten together, that it may be about the thickness of honey, and drench your Cervises in it, and then hang them up: so you may preserve them sound a while; and afterward you must wash them, that the morter which sticks upon them, may fall off. So, the fruit

Ziziphum may be shut up in earthen vessels

to be long preserved, as *Palladius* sheweth. But they must be gathered by hand, and that not before they be ripe; and you must shut them up in long earthen vessels, and plaister them over, and so lay them up. He sheweth also that

Medlars, and the fruit Tuber may be shut up in pitchers, so to be preserved.

You must put your Medlars into pitchers, that are besmeared with pitch on the inside; but the pitchers wherein you put your Tubers, must not only be pitched on the in-side, but also daubed over on the out-side. So *Didymus* sheweth, that

Myrtle-berries

Myrtle-berries may be very well kept

to last long, if you gather them when they are green, and put them into a vessel, that is not pitched, and so cover it close, and lay them up. Others lay them up with tails or stalks upon them. *Palladius* sheweth, that

Nuts may be long preserved,

if you shut them up close in coffers; but the coffers must be made of Nut-tree. The same *Palladius* shews, that

Chest-nuts may be long preserved,

if you put them in wicker baskets, and plaister up the baskets round about: but the rods which the baskets be made of must be Beechen-rods; and they must be made up so close, that no air may come at that fruit which is in them. Likewise

Roses may be shut up to be preserved,

if you take green Barley being pluckt up by the roots, and put them into a barrel that is not pitched, and lay Roses in amongst it before they be blown: for by this means you may keep them long. So also you may shut up

Lillies, to make them last a whole year.

You must gather them with their boughs, as they grow, before they be blown, and put them into new earthen vessels that were never pitched, and when you have covered the vessels, lay them up; and so shall you have Lillies of a year old. But if you have use for any of them in the mean time, bring them forth into the Sun, and by the heat thereof they will be opened and blown. We will shew also out of *Didymus*, how

Grapes may be shut up to last long,

Some take certain cases that are pitched all within, and when they have strewed them with the dust or dry powder of the Pitch-tree, or the Firre-tree, or the black Poplar-tree, or else with the dry flower of Millet, then they put in their grapes, and so they last long: but they take their grapes presently after the time of Vintage, and make special choice of those grapes that are without any bruise or blemish, and they shut up the mouth of the vessels very close, and overlay them with morter. Or else they may be drenched in clay-morter, that is well beaten, and somewhat liquid, and then be hanged up, and so kept for a while, and afterward when you would use them, wash them over, that the morter may fall off. *Columella* saith; you must take the great Teat-grape, or else the hard-skinned grape, or else the fair purple-grape, from the Vine, and presently pitch their stalks with hard pitch: then take a new earthen Vatt, and fill it with dry chaffe well sifted, that it be without dust, and so hang up your grapes upon it: then take another Vat, and cover therewith the former, grapes and all: and when you have laid the brims of both vatts together, then daube them up with morter that is made with chopped straw; and when you have so done, place them in a very dry loft, and cover them all over with dry chaffe.

Wheat may be laid up close to be preserved,

by putting it into caves or pits of the earth, as we have shewed out of *Varro*; for the Cappadocians and Thracians put their Corn into Caves and Dens; the Spaniards put it into certain pits, and make special provision that the moisture and air may not come at them; except it be when they take out any for their use; for if the air do not breath upon it, it will be free from the mice and such like vermine: and it is known, that Corn being thus laid up, hath been kept clean and sweet fifty years together. *Marcus Varro* saith, that

Beans and Pulse have been laid up in vessels, and so preserved for a long time:

but

but they must be oyle-vessels, and they must be covered over with ashes. *Pliny* writes the very same experiment out of *Varro*; that Beans and Pulse being laid up in oyle-buts, and covered over with ashes, have lasted a great while; and being laid up in some hole of the earth, they have lasted an hundred and twenty years. So the Pulse called

Lintels, have been preserved long,

as *Columella* sheweth: for if you put them into oyle-vessels, or else into salting-tubs, that they may be full, and so plaister them over with morter, whensoever you take them forth again for your use, you shall find your Lintels sweet and good.

CHAP. VIII.

How the Ancients, when they had put their fruit into certain vessels, and so shut them up close, did put them also into some other vessels full of liquor.

HOwsoever the Ancients, by making up their vessels close, did shut out and keep away the air as being the Author of all putrefaction, so that it could not come in to the fruit: yet they did not by this means keep away the air out of those places where the vessels were laid, but that as the circumstant air was changed, either being disposed to heat, or cold, or drouth, or moisture, so the air also that is within, must needs be changed, and consequently, the fruit also must be affected with the same change. Wherefore, for the avoiding of all inconveniences which this way might ensue, after they had plaistered their fruit-vessels, and so made them up fast, they did drown these vessels in divers and sundry kinds of liquors. And surely not without great reason, as experience shews. For I have oft-times observed it, being seriously imployed in these affairs, that if the air be uniform, and without alteration, the fruits and flowers that have been shut up in vessels of glass, have lasted long without any putrefaction: but when once they felt any alteration in the air, presently they began to putrifie. For this cause are those vessels to be drowned in Cisterns, or ditches, or some places underneath the ground, that so the variable alterations of the air may not be felt by the fruit. And, to descend to experiments, we will first shew,

How Quince-pears being shut up close, may be drowned for their better preservation.

An experiment which *Democritus* hath set down. You must put your Quince-pears into a new earthen-vessel, and then cover it, and pitch it all over, and so put it into a but of wine; but so, that they may have scope to swim upon the top of the Wine: for by this means shall you keep your fruit fresh and good so a long time; and besides, the wine wherein they float, will have a very fragrant savour. Likewise

Apples being shut up close, and then put into Cisterns, will last long,

As *Palladius* sheweth. You must put your apples, saith he, into earthen vessels, well pitched and made up close: and when you have so done, drown those vessels in a Cistern, or else in a pit. *Pliny* putteth apples in earthen Basons, and so lets them swim in wine; for, saith he, the wine by this means will yield a more odoriferous smell. *Apuleius* saith, that Apples are to be put into a new pot, and the pot to be put into a Hogs-head of wine that there it may swim, and play on the top of the wine; for so, the Apples will be preserved by the wine, and the wine will be the better for the Apples. So

Figs being shut up close, may be drowned for their better preservation,

As *Africanus* affirmeth. They take figs, saith he, that are not very ripe, and put them into a new earthen vessel; but they gather them with their tails or stalks upon them, and lay them up every one in a several cell by it self: and when they have so done, they put the vessel into an Hogs-head of wine, and so preserve their figs. I have also proved it by experience, that

Peaches

Peaches being shut up in wooden Cisterns, have been well preserved by drowning.

And I have proved it also in other kinds of Apples, that if they be shut up in a small vessel that is very well pitched on the utter side, and so drowned in the bottom of a Cistern of water, and kept down by some weights within the water, that it may not float, they may be preserved many moneths without any putrefaction. By a sleight not much unlike to this,

Pomegranates may be preserved in a Pipe or But that is half full of water,

as *Palladius* sheweth. You must hang up your Pomegranates within the But; yet so, that they must not touch the water; and the But must be shut up close, that the wind may not come in. And as fruit may be thus preserved, if the vessels be drowned in water or other liquor; so there are some of opinion, that, if you hide those vessels underneath the ground, you may by this means also eschew the danger of the alterations that are in the air. *Columella* sheweth, that

Cervises being shut up close, and so laid under ground, will thereby last the longer.

When you have gathered your Cervises charily by hand, you must put them into vessels that are well pitched, and lay also pitched coverings upon them, and plaister them over with morter: then make certain ditches or trenches about two foot deep in some dry place within doors; and in them so place your pitchets, that the mouth may be downward: then throw in the earth upon them, and tread it in somewhat hard. It is best to make many trenches, that the vessels may stand asunder, not above one or two in a trench; for when you have use of them, if you would take up any one of the vessels, none of the rest must be stirred; for if they be, the Cervises will soon putrifie. *Pliny* reports the like out of *Cato*: that Cervises are put into earthen vessels well pitched, the covering being plaistered over with morter, and then put in certain ditches or pits about two foot deep; the place being somewhat open, and the vessels set with the mouth downward. And *Palladius* writes out of those two Authors, that Cervises must be gathered while they be somewhat hard, and laid up even when they begin to be ripe;they must be put in earthen pitchers, so that the vessels be filled up to the top, and covered over with morter, and laid in a ditch two foot deep, in a dry place where the Sun cometh; and the mouths of the vessels must stand downward, and the earth must be trodden in upon them. The same Author writeth that

Pears being shut up in vessels, and so laid under the ground, will last the longer.

You must take those pears which are hard both in skin, and in skin and substance: These you must lay upon an heap; and when they begin to wax soft, put them into an earthen vessel which is well pitched, and lay a covering on it, and plaister it over with morter. Then the vessel must be buried in a small ditch, in such a place as the sun doth daily shine upon. Others as soon as the pears are gathered, lay them up with their stalks upon them in pitcht vessels, and close up the vessels with morter or else with pitch; and then lay them abroad upon the ground, covering them all over with sand. Others make special choice of such pears as are very sound, somewhat hard and green; and these they shut up into a pitcht vessel, and then cover it and set the mouth of it downward, and bury it in a little ditch in such a place as the water runs round about it continually. In like manner also

Apples being shut up close, may be hidden within the ground for their better preservation,

As *Pliny* sheweth. You must dig a trench in the ground about two foot deep, and lay sand in the bottom of it, and there put in your apples; then cover the pit first with an earthen lid, and then with earth thrown upon it.Some put their apples in earthen basons, and then bury them. Others put them into a ditch that hath sand cast into the bottom of it, and cover it onely with dry earth. The like device it is whereby

Pome-

Pomegranates are preserved in small Buts which have sand in them.

You must fill a small But up to the middle with sand, and then take your pomegranates, and put the stalk of them every one into a several cane, or into the bough of an Elder-tree; and let them be so placed asunder in the sand, that the fruit may stand some four fingers above the sand: but the vessel must be set within the ground in some open place. This also may be done within doors, in a ditch two foot deep. Others fill up the But half full of water, and hang the pomegranates within the But, that they may not touch the water; and shut up the But close that no air may come in. *Cato* sheweth how

Filberds may be preserved within the ground,

You must take them while they be new, and put them into a pitcher, and so lay them in the ground; and they will be as fresh when you take them forth, as when you put them in. In like manner *Palladius* sheweth that

Chestnuts may be preserved,

if you put them in new earthen vessels, and bury them in some dry place within the ground. He saith also that

Roses being shut up, may be buried in the ground for their better preservation,

if they be laid up in a pot, and well closed, and so buried in some open place. But now we will shew

How all things that are shut up, may be preserved for many years.

Fruits are to be laid up in vials of glass, as we shewed before: and when the pipe or neck of the glass is stopt close up, then they are to be drowned in cisterns, and they will last good for certain whole years. Likewise, flowers are to be closed up in a vessel that is somewhat long, and the neck of it must be stopt up, as we shewed before, and then they must be cast into the water: for by this means they may be kept fresh for a long time. I have also put new wine into an earthen vessel that hath been glazed within, and have laid it in the water with a waight upon it to keep it down; and a year after, I found it in the same taste and goodness, as when I put it into the vessel. By the like device as this is, we may preserve

Things that are shut up, even for ever,

if we wrap them up in some commixtion with other things, so that the air may not pierce them through; but especially, if the commixtion it self be such, as is not subject to putrefaction. I have made trial hereof in Amber, first reducing it to a convenient softness, and then wrapping up in it that which I desired to preserve: For whereas the Amber may be seen thorow, it doth therefore represent unto the eye the perfect semblance of that which is within it, as if it were living, and so sheweth it to be sound, and without corruption. After this manner I have lapped up Bees and Lyzards in Amber, which I have shewed to many, and they have been perswaded that they were the Bees and the Lyzards that *Martial* speaks of. We see every where that the hairs of beasts, and leaves, and fruits, being lapped up in this juice, are kept for ever; the Amber doth eternize them. *Martial* speaks thus of the Bee, A Bee doth lie hidden within the Amber, and yet she shines in it too; as though she were even closed up within her own honey: A worthy reward she hath there for all her labours; and, if she might make choice of her own death, it is likely she would have desired to die in Amber. And the same Author speaks thus of the Viper, being caught as it were in the same juice: The Viper comes gliding to the dropping Pine-tree, and presently the Amber juice doth overflow her: and while she marvails at it, how she should be so entangled with that liqour, upon the sudden it closeth upon her, and waxeth stiff with cold. Then let not *Cleopatra* boast her self in her Princely Tomb, seeing the Viper is interred in a Nobler Tomb then she. But if you desire to know how to make Amber soft, though there be divers ways whereby

whereby this may be effected, yet let this way alone content you, to cast it into hot boiling wax that is scummed and clarified: for, by this means it will become so soft and pliant, that you may easily fashion it with your fingers, and make it framable to any use. Onely you must bee sure that it be very new.

Chap. IX.

How Fruits may be drenched in Honey, to make them last for a long time.

The Antients finding by experience, that the shutting up of fruits in vessels, and the drenching of those vessels in water, was a notable preservative agaiust corruption, did thence proceed farther, and began to drench the fruits themselves in divers kinds of liquours; supposing that they might be the longer preserved, if they were sowsed in honey, wine, vineger, brine, and such like, in as much as these liquors have an especial vertue against putrefaction: For honey hath an excellent force to preserve, not fruits onely, but also even the bodies of living creatures from being putrefied, as we have elsewhere shewed that *Alexanders* body, and the carkass of the *Hippocentaur* were preserved in honey. Meer water they did not use in this case; because, that being moist in it self, might seem rather to cause putrefaction. But of all other liquors, honey was most in request for this purpose, they supposing it to be a principal preserver against corruption. *Columella* saith

That Quinces may be preserved in honey without putrefaction;

We have nothing more certain by experience, saith he, then that Quinces are well preserved in honey. You must take a new flagon that is very broad brimmed, and put your Quuinces into it, so that they may have scope within, that one may not bruise another; then when your pot is full to the neck, take some withy twigs, and plat them over the pots mouth, that they may keep down the Quinces somewhat close, least when they should swell with liquor, they should float too high: then fill up your vessel to the very brimme with excellent good liquefi'd honey, so that the Quinces may be quite drowned in it. By this means, you shall not onely preserve the fruit very well, but also you shall procure such a well relished liquor, that it will be good to drink of. But in any case take heed, that your Quinces be through ripe which you would thus preserve: for if they were gathered before they were ripe, they will be so hard, that they cannot be eaten. And this is such an excellent way, that though the worm have seized upon the Quinces before they were gathered, yet this will preserve them from being corrupted any farther: for such is the nature of honey, that it will suppress any corruption, and not suffer it to spread abroad: for which cause it will preserve the dead carkass of a man, for many years together, without putrefaction. *Palladius* saith, that Quinces must be gathered when they are ripe, and so put into honey, whole as they are, and thereby they will be long preserved. *Pliny* would have them first to be smeared over with wax, and then to be sowsed in honey. *Apitius* saith, Quinces must be gathered with their boughes and leaves, and they must be without any blemish, and so put into a vessel full of honey and new wine. The Quinces that were thus dressed, were called *Melimela*, that is to say, Apples preserved in honey: as *Martial* witnesseth, saying, Quinces sowsed in pure honey, that they have drunk themselves full, are called *Melimela*. Likewise *Columella* sheweth that

Other kind of Apples may be so preserved,

Not onely the Melimela, but also the Pome-paradise, and the Sestian Apples, and other such dainties may be preserved in honey: but because they are made sweeter by the honey, and so lose their own proper relish which their nature and kind doth afford, therefore he was wont to preserve them by another kind of practise. *Palladius* saith, That

Pears may be preserved in Honey,

if they be so laid up therein, that one of them may not touch another. So *Africanus* reporteth, That

Figgs may be long preserved in Honey,

if they be so disposed and placed in it, that they neither touch each other, nor yet the vessel wherein they be put; and when you have so placed them, you must make fast the lid of the vessel upon them, and there let them lie without troubling them. And *Palladius* reports the same: Green Figs, saith he, may be preserved in Honey, if you place them so that they may not touch each other. *Florentinus* also sheweth, That

Cherries may be preserved in Honey,

if you put them into a vessel that is strawed in the bottom with Savory, and so cast some honey upon them; but your honey must be somewhat sharpe. So likewise

Medlars may be preserved in Honey,

to last a great while without rotting, as *Palladius* sheweth: but then they must be gathered before they be throughly ripe. *Martial* sheweth also, That

Nuts may be preserved in Honey,

to be green all the year long; and he speaks it of his own trial and experience. You must take green Nuts, and pluck them out of their shells, and so let them be sowsed in honey: and the honey wherein they are sowsed, will become very medicinable, insomuch that if you make a potion of it, it will be very helpful to cure the Arteries, and the Jaws. *Palladius* saith, That

Peaches may be preserved in Honey,

if you take out the stone before you sowse them; and besides that they will last long, this will also make them to be very well relished. He saith also that they may be well preserved in the liquor Oxymel. To be brief, *Columella* saith plainly that there is no kind of fruit but may be well preserved in honey. But he prescribes it for a general rule in this case, that every kind of fruit should be preserved in several by it self: for if you lay up divers kinds of fruits together, one of them will corrupt and marre the other. So also

Grapes may be preserued in Honey,

and they will last long without any blemish in them, if they be so preserved, as *Didymus* writeth. But we will shew now,

What kinds of fruits are best preserved in Honey.

For, I have endeavoured my self in this Practise, how to keep fruits without putrefaction, and for this cause, I laid up all kinds of fruits in vessels of glass filled with honey, that so I might prove, which might be preserved longest: and I found great difference among them, some kinds lasting long and some but a little while. For, the fruits that were by their own kind, full of moisture, did attaint the honey; so that the honey being it self attainted, was not possibly able to preserve the fruit from putrefaction. Grapes, Figgs, and Peaches are soon putrified by reason of their moistness; Quinces, Apples, and Pears do last longer uncorrupted; but Nuts will will last green and sound a whole year together.

CHAP.

Chap. X.

How fruits may be long preserved in ordinary wine, or sodden wine, or new wine, or else in wine-lees.

THe Ancients likewise perceiving, that wine would keep all things, and that grapes-stones lighting into the wine as it was barrelled up, did continue whole in the barrels for the space of a whole year; thence they gathered, that those fruits which were laid up in wine, would be well preserved from putrefaction. Neither did they stay there, but also proceeded to use sodden wine, new wine, vinegar, and wine-lees, for that purpose, because all these have a smatch of the substance of wine it self. But we considering that there may be a very pure and durable liquour extracted out of the substance of wine (for wine, as it is of it self, will sooner be corrupted) have therefore used the help of that extraction, whereby to preserve things sound and good time out of mind. But to return to them, and set down their examples. *Palladius* sheweth, That

Quinces may be preserved in wine.

For, if we lay them up in vessels filled with very good wine, half with ordinary wine, and half with new wine, we shall by this means preserve Quinces a great while. Others sowse them in barrels of new wine onely, and so close them up; whereby they cause the wine to yield a very fragrant smell. So *Democritus* makes choice of the fairest and soundest quinces, and putteth them into barrels of new wine, and thereby doth preserve his quinces and better his wine. So

Apples may be preserved floating in wine,

as the same Author sheweth. You must put some few apples into a barrel of wine that they may float up and down, and so shall you also better the wine. *Democritus* would have them to be put into earthen pots; but *Apuleius* would have them put into barrels, and so closed up; and thus, saith he, shall you procure an admirable sweetness and pleasantness in the wine. Others would have them put into a new pot, and the pot to be drenched into a barrel of wine, so that they may there swim, and then the barrel to be made up close; for this will be best both for the wine and also for the apples. Likewise

Figgs may be long preserved in wine,

as *Africanus* sheweth. You must make a new earthen pot, not altogether round, but rather somewhat square, having a good sound bottom; then you must gather your figs with their sprigs and stalkes, and that before they be through ripe; then put them fresh into your vessel, and place them so that they may lie from each other a pretty distance; and so put them in a barrel full of wine, and there let them swim; but the barrel must be very well closed up, that the air get not in: and until the wine change and become sowrish, the figs will never change, but continue in the same estate as when they were put in. *Palladius* doth report the very same experiment out of the very same Author. *Beritius* sheweth, That

Mulberries may be preserved in wine:

But it must be such wine as is made of Mulberries; and the vessells wherein they are put, must be made up very close. Likewise *Pamphilius* sheweth, That

Damosins may be preserved in wine,

if they be put into Hogsheads either of sweet wine, or else new wine, there to swim up and down, and the Hogsheads well covered. *Palladius* also teacheth, That the fruit

Ziziphum may be preserved in wine.

so that it shall not have any screwls or wrinkles: for, if it be fresh gathered, and suppled with drops of new wine, it will continue plumpe and full without any wrinkles. *Didymus* sheweth

How Grapes may be preserved in wine,

You must take a barrel that is half full of new wine, and therein hang up your grapes in such sort, as the clusters may not touch each other, nor any of them touch the wine: for by this means they will continue as sound as they were upon the Vine. Some do preserve them in wine that is alayed with water. Grapes thus preserved in wine, have been in great request among the Ancients. *Athenæus* makes mention of them out of *Eubulus* in *Agglutinato*: you must, saith he, minister unto him good store of grapes preserved in wine: And *Pherecrates*, among other things that are to be eaten, makes mention of grapes that were taken out of wine. *Cato* sheweth, That

Pears may be long preserved in sodden wine,

especially the Tarentine-pears, and the Must-pears, and the Gourd-pears. *Varro* saith, That the pears called Anciana, and Sementina are to be preserved in sodden wine. *Pliny* saith, That the Tarentine-pears, and the Anciana are so preserved. *Palladius* saith, That they may be preserved either in sodden wine or else in new wine; but, saith he, The vessels which they are put into, must be filled up with that liquor wherein they are to be preserved; which very same precept he learned out of *Democritus*. *Columella* sheweth how to make this kind of sodden wine of that sweet wine which is called Mustum. *Palladius* sheweth also, how that kind of

Peaches, which hath the hardest stone, may be preserved long in sodden wine,

You must fill up the Navel of the Peach (or that place wherein the stalk was fastned) with a drop or two of scalding pitch, so that the wine may not get into the peach by that passage; and then shut up the vessel very close, that the air may not get in. *Columella* saith, That

Cervises may be long preserved in new wine,

if you plat some dry fennel above them, to keep them under, that still the liquor may overflow them: but the coverings or lids of the vessels must be well pitched, and plaistered over with morter, that the air may have no access unto them. *Pliny* saith, That Cervises are to be preserved in sodden wine, by the judgement of *Cato*. *Palladius* also saith, That Cervises may be preserved long in sodden wine. *Columella* sheweth

That Grapes may be preserved in new wine,

You must take a barrel that is well pitched, and put into it a certain quantity of new wine; then make a hurdle as it were, of good stiff rods platted together, a little above the liquor: then place upon those hurdles, certain new earthen vessels, and therein so dispose your grapes that they may not touch each other; then cover your vessels and stop them up, after that, make another such a loft of hurdles, and then another, and so forward, as far as the greatness of the barrel will give you leave; and in every one of those rooms place your grapes, as in the first: then take the pitched cover of your barrel, and smear it all over with good store of new wine, and when you have laid it upon the barrel, make it up close, and lay ashes upon it. Others make no more ado, but onely put their new wine into the barrel, and make certain hurdles over the wine, and there hang their grapes out of the reach of the wine, and so cover the barrel and stop it up. The same Author likewise reporteth, That

Damo-

Damosins may be long kept in new Wine.

About harvest time, you must gather Damosins not being throughly ripe, nor yet too green, (but they must be wilde Damosins, such as are in colour like to the Onix-stone) and you must dry them in some shadowy place, the third day after they were gathered: then you must mingle vineger with new Wine, or else with sodden wine, in equal portions, and so put your Damosins into it. But they will be preserved the better, if you make your medley of a certain quantity of vineger, blended with twice so much water. Or else you may take the purple-coloured Damosins, and lay them up in an earthen vessel well pitched, and then fill it either with new, or else with sodden wine, so that the whole fruit may lie under the liquor; and then lay the covering upon the vessel, and plaister it up. We may also preserve

Cucumbers in the Lees of Wine,

as the Quintiles are of opinion. You must, say they, put your Cucumbers into the Lees of White-wine, before it be sowre, and see that your vessel be top-full; for by this means your Cucumbers will last fresh and good a great while. *Didymus* writes, that

Olives and Grapes may be kept together.

You must take Grapes while they be fresh, and new, and whole, and lay them up in a vessel amongst Olives, so placed, that every Olive may stand betwixt two Grapes, and so every Grape betwixt two Olives; and thus, the vessel being well closed up, they will preserve each other. *Columella* saith, that

Corneile, or Hamberry may be kept in Lees;

and if it be well preserved so, it will serve to be used in the stead of Olives. *Ovid* declares this in the eighth book of his Metamorphosis. *Columella* shews that

Grapes may be preserved fresh and green in the Lees of wine.

You must gather your grapes when they are of a reasonable ripeness, and then lay them upon certain hurdles, so that one cluster may not touch the other: then bring them within doors, and tuck away the dry, and withered, and rotten grapes with a pair of tuckers: and when they have lyen a while cooling out of the Sun, take three or four clusters according as the bigness of your pot is, and put them into it amongst the Lees; and let the lid be made up fast with pitch, that the liquor may not break forth. Then you must take a great many of Vine-stalks, and squeeze or press them well, with their grapes upon them: then lay the stalks and husks in the bottom of a barrel, and therein place your pots that you have filled with Lees and Grapes, and let their mouths stand downward, and let them stand in distance each from other, so that you may ram in good store of Grape-kernels betwixt them: and when you have filled the room with Grape-stones stufft in hard about the pots; you must make a second room like the first, and fill it up in the same manner: likewise you must make a third room and so forward, till the barrel be thoroughly filled even to the very brim, with pots, and Grape-stones crammed in fast and thick about them; then straightway cover the barrel and make it up close, and lay ashes upon it. But you must look to it, when you take forth any of the pots, that you take out a whole row together: for the Grape-stones being stamped in thick together must not be stirred; if they be, they will become sowrish very soon, and so they will marre the grapes. The Quintiles say, that

Cucumbers may be preserved in vineger;

and that very fresh and in their natural strength, if you hang them up in a vessel that hath some vineger in it, that they may not touch the vineger, and then close up the vessel fast, that the air may not pass into it; for by this means you may have green and new Cucumbers in the Winter-time. So all other fruits may be preser-

ved

ved in vineger: but because vineger doth mar the taste of them, therefore we will not speak of such preservings. But hereby we have learned to preserve, time out of mind,

All things with distilled wine:

for wine is of it self subject to putrefaction many wayes: but when it is often distilled, that the quintessence be extracted from it, this extraction is free from all putrefaction whatsoever: wherefore all things that are drenched in this kind of liquor, if the vessel be carefully closed up, must needs last unputrified even for a whole age, nay for all eternity. At Rome, I saw a fish that was drenched in the water that had been distilled out of the Vine, and she was preserved five and twenty years, as fresh as while she was alive: and at Florence, I saw the like of fourty years continuance: the vessel was made of glass, and made up with the seal of *Hermes*. And I make no question, but that all things that are sowced in this kind of liquor, will last sound and good for many ages. How many sorts of things I have preserved by this one means, it were too long here to rehearse.

CHAP. XI.

That fruits may be very well preserved in salt-waters.

Next after wine, salt-water is of special use for preserving from putrefaction: for such things as have been drenched therein, have lasted long very sound and good. The Ancients saw that whatsoever was preserved in salt, was kept thereby from putrifying: wherefore, that they might preserve fruits from corruption, they have used to drench them in salt-waters. *Homer* calls salt a divine thing, because it hath a special vertue against putrefaction, and by it, bodies are preserved to all eternity. *Plato* calls it the friend of God, because no sacrifices were welcome to him, without salt. *Plutark* saith that the Antients were wont to call it a divine influence, because the bodies of creatures that were seasoned with salt from above, were thereby acquitted from corruption. Salt binds, and dries, and knits together, and doth priviledge bodies from putrefaction, that in their own nature must needs putrifie: as the Ægyptians custome manifestly sheweth, who were wont to season their dead bodies with salt, as *Herodotus* writeth. But let us come to examples. *Berytius* saith, that

Pomegranates are preserved in salt-waters.

You must take sea-water, or else brine, and make it boil, and so put your Pomegranates into it; and afterward when they are thorough cold, dry them, and hang them up in the Sun; and whensoever you would use them, you must steep them in fresh-water two dayes before. *Columella* rehearses the opinion of a certain Carthaginian touching this matter. *Mago* would have, saith he, that Sea-water should be made very hot, and Pomegranates being tied together with thread or broom-twigs, to be drenched in it till they change their colour, and then to be taken forth and dried in the Sun for three dayes, and afterward to be hanged up: and when you would use them, you must steep them in fresh and sweet water for the space of four and twenty hours before, and so they will be fit for your use. *Pliny* also reports out of the same Author, that Pomegranates are first to be hardened in hot Sea-water, and then to be dried in the Sun three dayes, and so to be hung up, that the evening dew come not at them; and when you would use them, to steep them first in fresh-water. *Palladius* writes the same out of *Pliny*; and he sheweth also, that

Damosins may be preserved in salt-waters.

They must be fresh gathered, and then drenched either in brine, or else in sea-water scalding hot, and then taken forth, and dried either in the Sun, or else in a warm Oven. *Columella* would have them drenched in new wine, sodden wine, and vineger; but he gives a special charge also to cast some salt amongst them, lest the worm

worm or any other hurtful vermine do grow in them. *Palladius* likewise sheweth, that

Pears will last long in salt-water:

first the water is to be boiled, and when it begins to rise in surges, you must skim it; and after it is cold, put into it your Pears which you would preserve; then after a while take them forth and put them up in a pitcher, and so make up the mouth of it close, and by this means they will be well preserved. Others let them lie one whole day and night in cold salt-water, and afterward steep them two dayes in fresh-water, and then drench them in new wine or in sodden wine, or in sweet wine to be preserved. Others put them in a new earthen pitcher, filled with new wine, having a little salt in it, and so cover the vessel close to preserve them. Likewise

Medlars may be preserved in salt-water:

They must be gathered when they are but half ripe, with their stalks upon them, and steeped in salt-water for five dayes, and afterward more salt-water poured in upon them, that they may swim in it. *Didymus* sheweth also, that

Grapes may be preserved long in salt-water.

You must take some sea-water, and make it hot; or, if you cannot come at that, take some brine, and put wine amongst it, and therein drench your clusters of grapes, and then lay them amongst Barley straw. Some do boil the ashes of a Fig-tree, or of a Vine, in water, and drench their clusters therein; and then take them out to be cooled, and so lay them in Barley straw. The grape will last a whole year together, if you gather them before they be thorough ripe, and drench them in hot water that hath Allome boiled in it, and then draw them forth again. The Antients were wont

To put salt to Wine, to make it last the longer,

as *Columella* sheweth. They took new wine, and boiled it till the third part was wasted away; then they put it into vessels, there to preserve it for their use the year following: they put a pinte and a half of this liquor thus boiled, into nine gallons of new wine unboiled; and after two dayes, when these liquors are incorporated together, they wax hot, and begin to spurge; then they cast into them half an ounce of salt beaten small, and that made the wine last till the next year. *Theophrastus* and *Pliny* write, that

The fruits of those Palm-trees which grow in salt places, are fittest to be preserved;

as those which grow in Judæa, and Cyrenian Africk, because those Countries especially do afford salt and sandy grounds: for salt is a great nourisher of these kinds of fruits, and they are preserved long, even by their own saltnesse; so that the salter the places are where they grow, the better will the fruit be preserved. So likewise that kind of Pulse which is called

Cicer, is preserved by its own saltness,

without any other dressing; for the nature thereof is, to have a saltish juice within it; whereby it cometh to pass that whereas all other Pulse are subject to corruption, and have some vermine or other breeding in them, onely this kind doth not engender any at all, because of the bitter and sharp saltish juice that is in it, as *Theophrastus* writeth. *Didymus* likewise writeth, that

Beans will last long in salt-water:

for, if they be sowced in sea-water, they will continue long without any blemish. *Pliny* also sheweth, that

Garlick may be preserved in salt-water;

for

for if you would have Garlick or Onions to last long, you must dip the heads thereof in warm salt-water; so will they be of longer continuance, and of a better taste. So

Cucumbers are preserved in brine,

as the Quintiles affirm; for if you preserve either Gourds or Cucumbers in brine, they will last long. So

Apples and Myrtles may be preserved,

by lapping them up in Sea-weed one by one, so that they may be covered all over with it, and not touch one another, as *Apuleius* sheweth. If you have no Sea-weed, then you must lay them up close in Coffers. *Aristotle* is of opinion, that the fruits of the Myrtle-tree need not to be lapped up in Sea-weed, thereby to keep them from falling off from the Tree, because they will stick on of themselves till they be thoroughly ripe; but the blades of them are preserved by wrapping Sea-weed about them: and the vapour of the Sea-weed thus wrapped about the blades, will keep the juice of the fruit from being changed to any further maturity, and cause it to continue long at one stay; and this is by reason of the saltness of the Sea-weed, whereby it doth intercept and dry up that moisture which should be derived into the fruit, to ripen it. We may learn also to preserve

Olives in brine, to have them good a year after.

Marcus Cato saith, that those kinds of Olives which are called Orchites, may be well preserved, if they be laid up in brine while they are green; or else, if they be powned with Mastick. *Columella* saith, that the Olives which are called Orchites, and those which are called Pansiæ, and the little round Olive called Radiolus, are to be knocked and beaten, and so cast into brine, and then to be taken out of the brine and squeezed, and so cast into a vessel together with the blanched seeds of Mastick and Fennel; then take a good quantity of new wine, and half so much strong brine or pickle, and put it into the vessel, and so the fruit will be preserved. Or else, you may cast your Olives whole into a vessel, and put in strong brine amongst them till the vessel be brim-full, and so take them out for your uses when occasion serveth. There are a certain kind of black Olives, called also Orchites, which *Cato* saith, are thus to be preserved. When they be dry, cast them into salt, and there let them lie for the space of two dayes; afterward take them forth and shake off the salt, and set them in the Sun two dayes together, and so they will be preserved. *Marcus Varro* reports the very same experiment out of *Cato*. *Columella* saith; while Olives be yet black and unripe, you must tuck them off the Tree with your hand in a fair Sun-shining day; and cull out the sound ones from those that have any blemish; and into every peck and and an half of Olives, put a quart and somewhat more of whole salt; then put them into wicker baskets, and there let them lie in salt thirty dayes together, that the Lees or dregs may be still dropping forth: afterward put them into some trey or such like vessel that you may wipe away the salt with a spunge; and when you have done so, barrel them up into a Hogs-head full of new wine or else of sodden wine, and by this means they will be lon gpreserved. *Didymus* teacheth to make condite or preserved Olives on this manner. When Olives are almost ripe, you must gather them with their stalks and all: then wash or steep them a whole day in cold water, and afterward lay them a drying upon wicker Lattises, handling them very gently; then put them in the bottom of a vessel, and cast good store of salt amongst them: and into five pecks of Olives, you must put in four gallons and two quarts of brine, and two pints and a half of vineger: And when you have filled up the vessel, shake them together, that the liquor may swim on the pot. *Columella*, *Palladius* and divers others do cast the Olives into Sea-water, and there steep them seven dayes together, and when they have taken them forth, they condite them with brine, and so put them up into some other vessel.

CHAP.

Chap. XII.

That things may be specially well preserved in Oyl and Lees of Oyl.

OYl, and especially Lees of Oyl, do excellently conserve things, defending them both from the injuries of the Air and of Animals. *Cato* doth in short enumerate the faculties of Lees of Oyl, he subacts the Barn-flores with Lees of Oyl, that Mice may not eat his Corn. That also

He may preserve his Grain in his Garner,

he dawbes the Pavement and Walls thereof with clay, confected with Lees of Oyl. That also

Moths may not eat his clothes,

he be sprinkles them with Lees of Oyl: as also that

Seed, Corn, lying in the fields may be kept from erosion by Animals,

if it be steeped in Oyl lees, as also Whetstones, Shoes, Brazen-vessels from rust, all Woodden-houshold-stuff, Potters-vessels and the like. The same *Cato* also saith,

That Myrtle branches may be preserued with their Berries on, in Lees of Oyl.

Bind these or any of the like Nature into bundles, put them into a vessel of Oyl-lees, so that the Oyl cover them, then cover the vessel. *Didymus* saith,

That roses may be kept in Oyl-lees

fresh and vigorous, if they be covered over with this liquor.

If you would preserve Figtree-branches with their fruits in Oyl-lees,

bundle them up with their leaves and all, and put them in a vessel of Oyl-lees, as we said of Myrtle; but if you would keep dry Figs from corruption, lay them up in a Potters vessel wet with Lees of Oyl decocted.

Olives may be preserved in Oyl,

for when they have lost their colour they may be gathered with their stalks preserved in Oyl, and a year after they will represent their green colour; and if you besprinkle them with common salt they will pass for new ones.

Chap. XIII.

How Apples may be long conserved in Sawdust with leafs and Chaff or straw.

THe Ancients have invented many Trees, whose fruits may be long preserved in their own saw dust because of its drynesss. Now every fruit is best kept in its own leaves dust, and the like, as we have said of Olives which are best kept in Oyl, Grapes in wine, &c.

Orenges may be kept in Cedar-dust.

As *Palladius* asserts, who avers that many have experienced it, in the like manner,

Quinces may be long kept in dust,

because as *Democritus* avers the dryness of the dust preserves them from putrefaction, they may be also kept long in Wooll, fine Tow, or the like in Chests.

The fruits of the Fir-tree may be long kept in dust.

Many diffuse the saw-dust of the Poplar, or Fir-tree, amongst their fruits for their preservation. *Apuleius* saith, You may lay them involved in fine Tow into a viminecous basket, and they will keep.

Pomegranates may be kept from putrefaction in Oak-dust.

Columella would have the dust first steeped in vinegar, and then they laid in it. *Mago* would have us first strew a new potters vessel with the dust, then lay in the apples, then strew another layer of dust, and another of apples, till the vessel be full, which we must shut and dawb close up. *Beritius* would have the dust first infused in vinegar.

Grapes may be kept in dust.

Some keep green Grapes in dry poplar, or firre-dust. *Didymus* would have them reposed in boxes overlaid with pitch, in the dry dust of the pitch or black poplar-tree. some preserve fruits in chaff, which by its innate frigidity, either keeps the frosty rigor unmelted, or by its genuine drynesse keeps all things from putritude; or by being void of all qualities keeps fruits in their proper quality. And first

Orenges may be kept in Chaff,

As *Palladius* avers, or in small straw. And the same saith, That

Quinces may be preserved in Chaff.

As also in small straw, as *Pliny* attests, who asserts also, That

Apples may be kept in Chaff,

or straw, they being laid upon and in it. *Palladius* saith, That

Pears will keep long in Chaff, and Medlars also,

if they be gathered on a clear day, half covered with chaff, and not again touched *Palladius* saith, That

Pomegranates may be kept in Chaff,

if they be not moved, or touched after their reposure.

Grapes may be kept in Chaff.

The clusters should be severally laid along the pavement, so that they touch not each other, with lupin-straw under them if possible, for it is dryer and hardest, and an enemy to Mice; but if not then Bean-straw, or such pulse: but if none of these, then dry hay cut small. *Palladius* saith, That

Nuts will keep in straw,

if Almonds cannot be easily excoriated, cover them with chaff and straw, and you may effect it. *Sotion* avers, That

Onyons may be kept from putrefaction in Barley-straw.

First put them into hot-water, dry them in the Sun, that done, lay them so in straw that they touch not each other. *Palladius* saith, That

Chesnuts may be preserved

in small Barley-straw, or in their own leafs: As also

Quinces in Fig-leaves.

Democritus would have them involved in leaves, and dawbed up with clay. *Palladius* saith, Apples may be kept from putretude in fig-leaves, who also avers,

That Orenges may be preserved,

in their own leaves, if they be laid severally. He also saith,

That Apples may be kept long in nut-leaves,

And *Apuleius* saith, Their colour, odour, and grace, will be hereby preserved, and that best if they be layed in fresh, not falling leaves: As also

That pears may be kept well in wallnut-leaves.

Democritus saith, The leaves must be dry, and the pears will be green at a years end. *Pliny* saith,

Figs may be kept in the leaves of Vervine without putretude.

Palladius would have them put in an Oven, and whil'st hot imposed in their own leaves and reconded in a pot. *Columella* would have dry Figs cast into a pitched vessel with dry hay in it and upon them. We may also

Preserve Cherries in the leaves of Winter-savory,

if we first cast the leaves, then the Cherries into a vessel, and so by course, or if we after the same manner lay Cherries in Reeds-leaves: thus also

May Jujubees be kept in their own leaves,

or else they may be cut of with their boughs and suspended. Thus also

May the Myrtle and its Berries be preserved,

either in a close vessel, or in Lees of Oyl. Thus also may

Quince-pears be long kept in their own leaves, and Nuts in their leaves, but the leaves must be dry, Wheat may be kept in herbs.

Tarentinus would have it imposed upon dry Wormwood and Semper-vive; but dry Quince leaves and small sand are better, which must be layed in layers among the Grain. It is best to cover the flore with Coniza, add after ten measures of Grain, to lay another layer of Coniza till all be deposed; for thus the whole will not be onely free from putretude for many years, but keep its due weight.

Barley may be kept safe in dry Bay-leaves,

Dry Grass with Mint mixed with Bran, preserve Barley special well. Some bray cummin and salt together, and make them into dry Masses for the preservation of Barley.

Chap. XIV.

How fruits may be mixed with many things for their better preservation.

And now that we may not further protract our speech, we shall from ancient Examples shew how fruits by immersion into several things, may be long kept from putretude: and first

Orenges in Barley putrefie not,

But if you lay them on hot Barley-bread, they putrefie quickly. *Palladius* saith,

That Quinces laid in Millet-seed, endure long,

for he thinks that Millet-seed corrupts not in many years, and so what is reposed in it cannot speedily putrefie. *Democritus* saith, Barley is better, being dry; but always provided that they be not laid near tender and fugacious fruits,

for they will vitiate them by their acid sapour, and putrefie grapes if they be near them.

Apples may be also kept in the same seed,

As *Pliny* is of mind. But *Apuleius* saith a heap of Barley is better. But you must always mind to repose each kind in its proper continent and place, because if divers kinds be occluded together, they vitiate sooner: wherefore the wine that is expressed out of several kinds of grapes, is not so firm as the simple and sincere.

Pears will keep amongst corn,

For as *Palladius* saith, The Siccity thereof is notably preservative.

Mushrooms may be kept in Millet-seed.

The *Vesuvians* also keep them in dry sand, till new ones come.

Pomegranates may be kept lay in Wheat,

if they be first dipped into hot waters, then reconded in Wheat, till they become rugous. *Varro* and *Cato* would have them put in a heap of sand for preservation. *Dydimus* saith,

That Grapes may be kept well and long,

if they be suspended in a Garner, for the dust that rises up of the corn when moved, causes long duration in grapes.

How Corn may be long preserved,

Tarentinus saith, The ashes of Oaks; others dry Beasts dung, strewed on corn preserve it; but small sand subacted with Lees of Oyl is better, for this corrupts all vermine and keeps the corn more dense and solid. Perfrigerated Argil is best of all, for it will keep corn thirty or forty years from corruption, you may let it through a strait seive when you use it.

Pulse will keep long,

if they be sprinkled with vinegar mixed with the juice of Laser.

CHAP. XV.

How other things may be preserved from putrefaction.

WE shall here recite what other things, though vile, may be preserved, and so make way for further inquisitions.

Quick-silver will preserve all things from putretude.

As fruits and the like, for we have often put fruits into a fit vessel, and cast quick-silver upon them, and so preserved them long and well.

Flesh hanged on a Brasen-nail will keep long,

For Brass is so stypical and exiccative, that the flesh it passes thorow putrefies not.

How a dead Carcase may be preserved.

First let the side of the Body be opened, and the Carcase exenterated; let the Skull be opened and the brains taken out, let the papills be substracted, as also the privities with the pith of the Back-bone, then hang up the Body by the feet for three or four hours, then wash it with a spung dipped in vinegar and *aqua vita*, then let it dry, which done, strew it with unquenched Lime, Alome and Salt; let it hang so two days in the smoak of Myrrhe, Bay, Rosemary, and Cypress in a dry and open place. Then make a mixture of unquenched Lime five pound, of burnt Alome

Alome one pound, good Salt two pound, of Aloes and Myrrhe half a pound, of Aloes-wood half a pound, of the Oyl of Spicknard three onces, of the powder of Rosemary-flowers five, of burnt Green-brass and Calcanthum two, of the best Theriack four, of the dust of Cypress half a pound, of dryed Saffron one once, of the seeds of Coloquintida three and a half, of Antimony beaten to powder one and an half, of the ashes of Wine-lees five and a half, of Musk half a dragm, of Amber two. Let all be diligently brayed and mixed together, and strewed upon the Body which must be for three days together strongly rubbed, in an open and dry place. This also we admonish, that in fat Bodies the fat of the Abdomen, Buttocks, Hips, Muscles of the Leggs, thighs; and all other places must be first abstracted.

Things may be also preserved by Balsom.

But seeing we can compass no true Balsom; or if there be any, it is exceeding dear we are glad to make artificial Balsoms, as we shall shew in due place.

Chap. XVI.

How divers sorts of Bread may be made.

We have spoken of preserving fruits and other things: It remains to shew how we may use those we have kept. Amongst the rest, we shall teach you concerning those things that are most necessary for dayly use, as for many kinds of Bread, Wine, Vinegar, and Oyls; that not onely the Housholder may provide for his family with small cost: but when provision is dear, he may provide for himself with small pains in Mountains and Desarts, of all those things almost we have spoken of. But we will begin with Bread, and see what our fore-fathers used in case of necessity. I shall let pass those common things, as Spilt, and Bean-corn, Amel-corn, Typh-wheat, Panick, Sesamum; being all well known. But first

To make Bread of Wall-nuts,

Dioscorides saith there is a kind of Thistle commonly found in the waters, that onely in Rivers brings forth a certain seed as big as a Ches-nut, with three points, membranous, full of white pith, that tastes like Ches-nuts; they call them water-chesnuts vulgarly, and the Inhabitants use them in meats, as they do Ches-nuts. Pilgrims make Chapelets of them. The *Thracians* that dwell by the River Strimon, fat their horses with this Thistle when it is green, and of the same seed they make Bread to eat. Moreover, in places where they grow amongst us, the Inhabitants when provision is dear make Bread of them; as at *Ferrara* they do of Ches-nuts, and the Brutii rost them in the embers and eat them for juncates. Almost in the same manner.

To make Bread of the Lote tree.

Theophrastus teacheth it. The Lote-tree grows in plain ground, where the Countries are overflowed with water. The fruit is like a Bean naturally, but less and more slender. That which grows on the head comes forth promiscuously, as Beans do many and very thick together: When the Sun sets, it closeth, and opens when he riseth, and springs up above the water. The head is as great as a Poppy-head, where it grows in *Euphrates*. The Egyptians lay those heads on heaps to putrefie; and when the shells are putrefied, they wash them in a River, and part the fruit from them, and dry it, and break it and make bread of it, and eat it. *Pliny*, There is also bread made of the seed of it, like to Millet seed, in Egypt by the Shepherds, and they knead it with water especially, or with milk. They say that nothing is more wholesom then that bread, or lighter whil'st it is hot, but cold it is harder to digest and becomes heavy. It is certain, that those who live upon that are never troubled with Dysenteries, Tenasmus, or any diseases of the belly. And therefore it is one of their remedies. For it was of old a custom;

To make bread of Dates,

which *Pliny* writes of, Dates that are very dry of Thebes and Arabia, that are slender and very lean, with a continual vapour they are terrified, and are covered rather with a Shel then a Skin. In Ethiopia it is crumbled (so great is the draught) and like meal it is made into bread.

Bread of the Mulberry-figtree.

In Caria and Rhodes there is a great Fig of Egypt, or increase of the Sycamore-tree, and in the neighbouring places where there is little wheat, the people for want of corn use it for bread, and for all bread corn. So great and continual plenty is there of that Apple, and abundance of bread is made of it pleasing to the stomach; but it affords but little nutriment, and we might make the same if we would. We find it in Writers of husbandry,

How we may make bread without leaven,

Out of *Didymus* some adde Nitre, for Nitre makes bread more crumbly, as it doth flesh also. Some the day before they make their bread, cast Grapes into the water, and the next day when they will make their bread they take them away, for they swim above the water, and they press them out, and use the moisture pressed forth for leaven, and so they make their bread more pleasing. If you would have leaven last you all the year, when the new wine hath boiled in the vessels, Skim off the froth that boils on the top, and mingle with it Millet-meal, and work it well together, and make morsels of it, which dry in the Sun, and lay up in a moist place; and you may take a sufficient quantity and use it for leaven.

CHAP. XVII.

Divers sorts of Bread made of Roots and fruits.

NOw we shall proceed to other kinds of bread, found out in our days, that are no small profit to us when corn is dear.

How to make bread of the Roots of Cuckow-pint,

the root of Wake-Robin, when it is not too acrimonious is eaten and desired in meats. *Dioscorides* saith, The decoction was drank, as not being over sharp. *Galen*, That it was eaten as Rape-roots, and in some Countries it grows more corroding. To prepare it rightly, pour out the water of the first boyling, and presently cast it into other hot water. In Cyrene those Roots are otherwise then amongst us, for there it is no Physical root, and is not acrimonious at all, so that it is more profitable then a Rape-root. Also our forefathers, when Corn was dear used this Root in meats with great profit. *Cæsar de bello civili*, Also there is a kind of Root, found by them that were with *Valerius*, which is called Chara, which mingled with milk releived a Souldier that was hungry, and it was made up like to bread. There was great plenty of this Root, and of it bread was made, when those of *Pompey* his side objected to our Souldiers that they wanted food, they would commonly throw these at them, that they might deceive their expectation. And a little after the Army used this and were very healthful. And in *Dioscorides* in the false names of simples, Cuckow-pint was of old called Chara, with us it is so acrimonious that we scarce can endure to touch it with our tongues. But I shall open the reason how excellent bread may be made of it, and if I may say so, better then Wheat-bread. The great Roots are made clean, and they are cut into small thin plates, for the thinner they are cut, the sooner will they become pleasant, and they must boil in vessels of hot water, until you perceive the water grow sharp and the Roots somewhat sweet; pour out the former water, and pour in fresh,

then boil them again, till the water become sweet, and the root when it is chewed hath no acrimony left. Then take them out of the water, and put them upon linnen cloths, extended and hanging up until they be dry, then grind them in handmils and the meal will be exceeding white, which by it self a with a third part of wheat-meal added to it, will make most pure bread and well tasted: There are other ways to make it sooner; when you have obtained this art, you will be exceeding glad I am very certain of it. For with great pleasure

Bread of Asphodils is eaten.

This is so fruitful of round-heads with us, that no Plant hath more, for oftimes 80 heads will be heaped together. Moreover, Mountains and Sea-shores are full of them, that it may be truly thought to be made for mans meat. *Pliny*, The Daffodil is eaten with the seed and head terrified. But this rosted in the embers as *Hesiod* affirms, is eaten with oyle also braied with figs, it is eaten with great pleasure. These Round-heads are like to Navews of moderate bigness. So saith *Galen* also. But with us they are so unpleasant, and acrimonious in tast, that a man cannot eat them; and Sowes digging them up with their snowts, will hardly feed on them, no not when we want corn can we eat this in our greatest hunger, it was the poor fair of frugal antiquity. But by boiling, the sharpness of it becomes more mild, and the heat of it more tolerable, as we said of *Cuckow*-pint. It will be sufficient to satisfie a mans hunger, as of old it was used: As *Pliny* saith, We have made most wholesom bread of these mingled with meal, especially for men wasted and in consumptions, also

Bread is made of Rape-roots, Turneps, and Skirworts.

For of those boil'd and cooked, first cleansed from all excrements, a most commendable bread may be made, as I have tried: But meal must be mingled with them to a third part, or else half as much of one, and the other as we shall shew a little after. And not to be tedious, the same way-bread to eat, may be made of all Navews, Roots, or Bulbous-heads. Also there is made

Excellent bread of Gourds,

For Gourds may be had very cheap, and they make savoury bread with meal, and so the bread is greater, for this is the greatest of all fruits; for with a very little meal in time of Famine we may feed many men, and not onely use it for need, but for dainties also: for seasoned with Sugar, and prepared for mens pallats, and to quench feaverish heats, they are carried about every where to be sold. The way to make them up is this, Take great round Gourds, and fully ripe, and cut into many pieces the dry skin, and the pith must be taken from them with a knife; put them into a kettle of boiling water, and boil them, for by long boiling the grassy greenness, and the rank smell and loathsom taste are taken away, and they will smell better and taste, and nourish better, and will last as long as bread. Being now brought to the form of an ointment, press it through a linnen strainer with your hands, that if any parts of it be not well boiled or any woddy pieces be there, they may be kept back by the narrowness of the strainer. To this Mass, adde a third part of meal, and make them into bread together, which will be pleasant to eat daily, I will not have you to eat your fill of it, but if you eat it moderately it will profit much. When it is new it is excellent, but stale, it is not so sightly nor dainty. I have shew'd you the way how you must use such things of superfluous moisture, now do you learn wisely to do it.

CHAP.

CHAP. XVIII.

Divers ways to make bread of all sorts of Corn and Pulse.

ANtiently they made Bread of divers kinds of Corn and Pulse, it would be needless to repeat them, for you may find them in the Books of the Antients, and there can be no error in making them. In *Campania* very sweet bread is made of Millet: Also the people of *Sarmatia* are chiefly fed with this bread, and with the raw meal tempered with Mares-milk, or blood drawn out of the veins of their legs. The Ethiopians know no other Corn then Millet and Barley. Some parts of France use Panick, but chiefly Aquitane: But *Italy* about *Po*, adde Beans to it, without which they make nothing. The people of *Pontus* prefer no meat before Panick. Panick meal now adays is neglected by us and out of use, for it is dry and of small nourishment; of Millet bread and cakes are made, but they are heavy and hard of digestion and clammy to eat. Unless they be eaten presently when they are newly baked, or hot, else they become heavy and compact together. Of the *Indian Mais*, heavy bread is made and not pleasant at all, very dry and earthly next to Millet: like to this is bread called Exsergo, that is also void of nutrimental juice. There was also of old bread called Ornidos, made of a certain seed of *Ethiopia*, so like Sesamum that it is hard to know them asunder. Also

Bread is made of Lupins,

The best kind was known also to the Antients; For *Didymus* teacheth how Lupins will grow sweet, being three days infused in River or Sea-water, and when they grow mild they must be dried and laid aside, and then the meal of them mingled with Barley-meal or Wheat-meal is fit to make bread. But we make it thus, First the Lupins are ground in mills, and are made into flower: fifty pound of these are put into a wooden vessel, and fair water is cast upon them, that it may swim four fingers breadth above them; and it must be often stirred with a woodden stick, then let it settle till the water grow clear, and the meal sink down, then strain the water well, that no meal be lost; and pour on water the second time, and stir it as before; do so the third time till the meal and water be come sweet, which will be done in one day if the water be often changed. As that is done, put the meal into a linnen cloth laid abroad, that the meal may be seperated with a wooden slice, and the water may run away through the cloth, and the meal may dry the better upon the cloth. In the mean time boil two pound of Rice, and being boil'd mingle them with the Lupins, divide the whole into two parts, and mingle one with the leaven and a hundred pound of wheat-meal, and make bread of it; let the other be set by with the leven till the next day, which being mingled again with wheat-meal, will make excellent bread, and will not taste of Lupins. But you must use all diligence in the making of it, for if you make it not of the best meal, the bread will be naught, wherefore the work lies in the right preparation of it: For the worse Corn or Pulse you make it of, the more Corn must be taken to prepare it. After this manner it may be made of Tares and Vetches, and the savour of them is dulcified with water and mingling meal with them. Bread is made also of Peason, Chiches, Tarses, Lentils, Beans, and chiefly of Acorns. But it is not unprofitable to make

Bread of Herbs,

If a man cut the Herb Clot-bur small and grind it in a mill to very fine powder, and adde as much or a third part of wheat-meal to it, it will make good bread, that may be eaten when there is a famine; and I have heard that the poor eat it in some places, and it hurts them not, and that some in a siege have lived a moneth with such bread.

Chap. XIX.

How bread may be increased in weight.

NOw I shall shew how bread may be augmented; a thing very strange and profitable, not onely to help in time of need, but it is good for the Housholder, for with little meal he may nourish many, and fill their bellies; and that three wayes: For there be things that added to Corn, will increase the substance of the bread; other things are dry, and of a clammy nature, that will thicken the Element by refraction into the substance of bread. The last way is the life of the heat of it, whereby it waxes and grows as if it were alive. As much as is lost by the bran taken from it, is added to it, by casting water on it when it is ground, and in the other workmanship. Moreover, the baking of bread takes away a tenth part and a half of the weight. Let us see how our Ancestors did by some Earth or

Chalk make their bread more weighty and white.

Pliny teacheth that Spelt will grow white by a kind of chalk, thus. Let this Spelt be of Beer-corn, which he called a seed; the corns of it are bruised in a wooden morter, for it will be spoiled and consumed by the hardness of a stone: the best as it is well known, is made by those that are condemned to bray in morters for their punishment. For the best there is an iron box, the hulls being then beaten off; again, with the same instruments the marrow of it being made bare, is broken; so are there made three kinds of this Spelt-meal, the finest, the second sort, and the third that is the coursest. But yet they are not white, which makes them excellent, yet now are these preserved at Alexandria; after this, (it is very strange) chalk is mingled with them, that passes both into the body and the colour of them, and makes them tender. You shall find this between Puteoli and Naples, on the Hill called Leucogæum. And there is extant a decree of *Divus Augustus*, wherein he commanded to pay them at Naples yearly 20000 Sestertia out of his Treasury, drawing his Colony to Capua, and he assigns the cause, by reason that they of Campania affirmed that Spelt-meal could not be made without that stone.

Rice makes bread weigh.

It neither corrupts the taste or goodness of the bread, but increaseth both, and it brings it closer by one eighth part, for by a continual turning it, it will retain eth volatil meal; and from hence you shall see it coagulate, and when it is coagulated put leaven to it; but it must first grow cold, lest the force of the coagulation should be hindred. To binde this fugitive servant fast, adde so much Wheat-meal as may fasten it well together, till you see there is enough, and you shall find it increased to the weight desired. By this example

You may increase the weight of bread with Millet.

This is easily done, for it is dry, crumbles, and will not hang together, and is weak; let it be bruised with a wooden pestle, and sifted through a sieve till the hulls be parted, as we see it done at Rome and at Florence; by this we hold it, that it flie not away by its hungry driness; then we mingle it with Wheat, and the air reflects back, and it will be converted into the substance of Alica, that you will think nothing taken from the taste, colour or goodness, nor yet added to it. Nor will it be unpleasant to see

Bread weigh more by adding milk to it.

This is an experiment of great profit and praise-worthy; for it adds weight and whiteness

whitenesse to bread, and makes it short, being put in instead of water whilst it is hot. I never tasted any thing more pleasant or tender. I thought fit to adde this for the singular vertue of it, adding also such things as we knew to be necessary for this art. But truly that is admirable; by the same

Wheat to increase the weight of Wheat.

This is done without any addition, for if we would, we could do this with many and almost infinite things, with any small addition; but in this a leaven is drawn forth of the very substance of the Wheat, which being strained, cleansed and added to the same again, either by increasing the substance of it, or by retracting the air into its substance, it will be much augmented: giving you this warning before-hand, that the augmenting heat must not be diminished, but preserved and increased, that all may depend on this. But an admirable work of Nature, and full of wonder it is, how it may be that

Wheat may increase out of it self.

I cannot discover this, how it came into my mind, lest it should be made publike to every common fellow, and ignorant Animal. Yet not to conceal it from ingenious men, I shall hide it from these, and open it to those. That our fore-fathers knew it not is clear, because there is no such thing mentioned in all their works of making bread. The whole businesse consists in this, that the Wheat-meal may be managed with the life of its heat, which is the off-spring of celestial fire. By nature it is of such tenuity, that being raised with its heat, it will make the lump swell so much, that it will come up to the top of the vessel; the next day cast it into a Hutch, and adde more meal to it, which again being raised by its heat, and coming back again by the same, and meeting with the lump, as flowing back again, it joins into the refracted Elements, and so into clotters of meal. Do this thrice or four times, and so you may increase it continually, and this must be done in a stove, that the dewy spirit may be fostered. I thought good to tell you also before, that you must not prick the lump, lest the generative blast should breath forth, and flie into the air, for so you will lose your labour; and there must not want presently a dewy vapour, which being carried into the air, and made to drop, may moisten the lump, so you will rejoice at the wonderful increase: but you must be cunning in the manual application. Pray do not destroy by your negligence, what was invented by the careful ingenuity of those that tried it.

CHAP. XX.

How we may long endure hunger and thirst.

THE Antients had some compositions to drive away hunger and thirst, and they were very necessary both in times of Famine, and in wars. *Pliny* saith, some things being but tasted, will abate hunger and thirst, and preserve our forces, as Butter, Licoris, Hippace; and elsewhere, *Scythia* first produced that root which is called Scythia, and about Bæotia it grows very sweet. And another, that is excellent against Convulsions, also it is a high commendation of it, that such as have it in their mouths feel nor hunger nor thirst; Hippace amongst them doth the same, which effects the same in horses also. And they report that with these two herbs the Scythians will fast twelve dayes, and live without drink also; all which he translated out of *Theophrastus* first book. The Scythian Hippace is sweet also, and some call it Dulcis; it grows by Mæotis. Amongst other properties, it quencheth thirst also, if it be held in the mouth. For which cause both with that

both with that, and with the other called equestris, men say, the Scythians will endure hunger and thirst twelve dayes. Hence it appears that *Pliny* translated all this out of *Theophrastus*. But I think he erred, for Hippace signifies Cheese made of Mares milk, and is no herb. *Theodorus* translated it Equestrem, as it were a root like Licoris, fit to drive away hunger and thirst. For *Hippocrates* saith, the Scythian shepherds eat Hippace, but that is Mares Cheese: and elsewhere, The Scythians pour Mares milk into hollow vessels of wood and shake it, and that froths with churming, and the fat of it they call butter, which swims on the top, that which is heavy sinks to the bottom, they separate this and dry it, when it is dry, they call it Hippace: the reason is, because Mares milk nourisheth exceedingly, and is as good as Cows milk. *Dioscorides*, The west Indians use another composition also

To endure hunger and thirst.

Of the herb called Tobacco, namely of the juice thereof, and the ashes of Cockle shells they make little balls and dry them in the shade, and as they travel for three or four dayes they will hold one of them between their under lip and their teeth, and this they suck continually, and swallow down what they suck, and so all the day they feel neither hunger, thirst, nor weariness; but we will teach another composition, which *Heron* mentions, and it was called

The Epimenidian composition, to endure hunger and thirst.

For it was a medicament that nourished much, and abated thirst, and this was the food the besiegers of Cities and the besieged also lived on. It was called the Epimenidian composition, from the Sea-onion called Epimenidium, that is one of the ingredients of that composition; it was made thus, The squil was boiled and washt with water, and dryed, and then cut into very small pieces, then mingle sesamum a fift part, poppy a fifteenth part, make all these up with honey, as the best to make up the mass, to mitigate it: divide the whole, as into great Olives, and take one of these about two of the clock, another about ten; and they felt no hurt by hunger, that used it. There is another composition of the same, that hath of Athenian sesamum half a Sextarius, of honey a half part, of oyle a Cotyle, and a Chænice of sweet Almonds mundified: the sesamum and Almonds must be dried, and ground, and winowed, then the squil must have the outsides taken off, and the roots and leaves must be cut into small pieces, and put into a morter and bruised, till they be well mollified; then you must make up the squils with the like quantity of honey and of oyle, and put all into a pot, and set them in cold, and stir them well with a wooden ladle, till they be well mingled, when the lump is firm, it is good to cut it into little morsels, and he that eats one in the morning, another at night, hath meat enough. This medicament is good for an Army, for it is sweet, and so fills a man and quencheth thirst: we had this in an old Scholiast, a Manuscript upon the book of *Heron*, in the Vatican Library. I saw the same composition in *Philo*, in his fifth book of wars, where he describes such like other things.

CHAP. XXI.

Of what fruits wines may be made.

NOw we shall speak of fruits, of which wines may be made. And first our Ancestors did do thus, but they had two wayes; for some were for Physicks, which are found plentifully in Physick books: others again were for ordinary use, and they were divers, and almost infinite, according as the differences of places and Nations are: for what is granted to one is denyed to another. First

Wine of Dates.

Pliny saith that in the East they make wine of Dates, and he reckons up fifty kinds of Dates, and as many different wines from them; Cariotæ are the chief, full of juice, of which are made the principal wines in the East, they are naught for the head, and thence they have their name. The best are found in Judæa, chiefly about Jericho, yet those of Archelaiis are well esteemed, and of Phaselis, and of Libias, valleyes of the same Country. The chiefest property they have is this, they are full of a white fat juice, and very sweet, tasting like wine with honey. The wine will make one drunk, and the fruit also eaten largely. *Dioscorides* teacheth thus; Put ripe Dates called Chydeæ, into a pitcher with a hole at bottom, and stopt with a pitched reed; shut the hole with linnen, and to fourty Sextarii pour on three gallons of water. If you would not have it so sweet, five gallons will be sufficient to pour on; after ten dayes take away the reed with the linnen, take the thick sweet wine and set it up. Also wine is made

Of Figs.

Sotion relates it thus. Some make wine of green figs, filling half the vessel with them, and the other half to the brim they fill with fair water, and they try still by tasting; for when it tasts like wine, they strain it and use it. It is made, saith *Dioscorides*, of ripe figs, and it is called Catorchites or Sycites, Chelidonian or Phænician figs called Caricæ, are steeped in a pot with a hole in the bottom with a pitched reed, and the hole stopt with flax: to fourty Sextarii you must pour on three gallons of water, and if you will not have the wine so sweet, pour on five gallons and it will do. After ten dayes the liquor is taken, and again the third time also the same measure of water wherein the figs were infused, is poured on; and in the like manner, after four or five dayes it is drawn off. Some to six Amphoræ thereof adde ten Sextarii of salt, that it may not early corrupt: others put Fennel and Thyme in the bottom, and the Caricæ on the top, and so in order, till the vessel be full: also men make

Wine of Pears,

which from the Greek word for Pears is called *Apyres*, and from the Latin *Piery* *Palladius* saith it was thus. They are bruised and put in a very course bag of Canvas, and pressed with weights, or in a Press. It lasts in the Winter, but in Summer comes it sowrer. *Dioscorides* will not have the Pears too ripe; the same way is made

Wine of Pomegranates.

Sotion makes wine of the grains of the Pomegranate, taking away what is in the middle of the grains. *Palladius* put the ripe grains well purged into a Date pail, and press them out with a scrue press, then boil them gently to half; when it is cold, put it into vessels that are pitched or plaistered with Gipsum. Some do not boil the juice, but to every Sextarius they mingle one pound of honey, and put all in the said vessels and keep it. There is made

Wine of the Lote-tree fruit.

There is a kind of Lote without any inward kernel, which is as hard as a bone in the other kind: wine is pressed also out of it like Mead, that will not last above ten dayes; *Nepos* saith the same from *Pliny*, *Athenæus* from *Polybius*. Wine is made of the Lote steeped in water and bruised, very pleasant to the taste as the best Mead is; it is drunk pure without water also, but it will not last above ten dayes, wherefore they make but little for use to last onely so long. Vineger is made also of it, And yet not much or good enough, yet there is made

Wine of Myrtle-berries and Cornels,

Out

Out of *Sotion*, who of the berries of Myrtles and Cornels when they are fresh, pounded and pressed out, made wine. Now I shall shew how we may make

Wine of Corn.

Drink is made of Corn. *Dioscorides* teacheth to make Beer of Barley, also a drink is made of Barley called Curmi, they use that drink oft-times for wine; the like drinks are wont to be made of Wheat. In Hiberia toward the west and in Britany; whence *Pliny*, of Corn drink is made: Beer in Egypt, called Zythum, in Spain Cælia and Ceria, Beer in France and other Provinces. In *Aristotles* book of drunkennesse, those that drink wine made of Barley till they be drunk fall upon their backs, they call that wine *πῖνον*, but those that are drunk with any other kind of drinks fall any way, on the right, or left hand, forward or backward, but those that drink Pinum, fall onely upon their backs. Wine made of Barley they call Brytum. Sophocles in Triptolemo, and Æschylus in Lycurgo. But *Hellanicus* saith, that Brytum is made in Farms out of roots. *Hecateus* saith, that the Egyptians grinde Barley to make drink, and that the Macedonians drink Brytum made of Barley, and Parabia made of Millet, and Rice, saith *Athenæus*. Also wine is made of Rice; for saith *Ælianus*, when an Elephant fights in war, they give him not onely wine of grapes, but of Rice also. Now the same drink is made in the Northern Climates of Corn, and they call it Biera, but they put hops to it, for it cannot be made without; Barley and Wheat are infused in the decoction of it. We see that of Barley and Wheat steeped in water a drink is made that tastes like wine, and of them I have made the best *aqua vitæ*. But these drinks of old were Physical, rather then to use as wine. But I shall shew how some drinks that are so like wine in taste, that you would think they were wine indeed. And first

Wine of Honey.

To nine vessels of water put eighteen pounds of Honey, into brass Caldrons covered with Tin, and let them boil a long time, stirring all with wooden ladles, and wiping away the froth that riseth with little brushes, pour it out, & put it into a wine vessel, then take two pounds of red wine Tartar, and boil them in water till they be dissolved, to which add an eighth part of a vessel of vineger, that the loathsome and unpleasing taste of the sweetness of Honey may be lost, let these be mingled; then pour on two vessels of the best wine, then let it settle; after some days strain it through a hair-cloth strainer, or one of cloth to cleanse it from the filth and excrements. A liquor will run from this that will serve for sparing, and to abate charge in a family, and it is good to drink in health and sickness: cover it close, and drink it. I shall shew you another way to make

Wine of Raisins.

Pour into a brass Caldron seven vessels of water, put in two pounds of Raisins, let them boil till they be wasted in the water, and the water be sweet as Mead; if your kettle be too small, do it at several times: then take your kettle from the fire, and when the liquor grows cold, strain it gently forth; put up the strained liquor in a wine vessel, and pour into it a measure of the sharpest red wine vineger to abate the sweetness of the Raisins, then add nine pound of Tartar finely powdered unto it, and pouring on a fourth part of the best wine, stop the vessel close when it is full, after one week use it. Another

Wine of Quinces.

Put into brass Caldrons glazed with Tin a vessel of new wine, and put thereto about fifty wild Quinces, namely such as are full of streeks and wrinkled, take out their kernels, cut the Quinces in peices like as you do Rape Roots, boil all at a gentle fire; when they have boild a while, take them off, and let them cool, pound the Quinces in a morter with a wooden pestle, press them out with a press, put the juice pressed forth of them the new wine, and set it up in a glazed earthen vessel for a whole year. When wine is scarce and you have occasion to use this, put

into

nto a vessel four parts of water, two of new wine, and one fourth part of the aforesaid mixture, cover the vessel and let it boil, and when it is clear; use it. Of all these an amphora of vineger, a pound of honey, as much Tartar in powder, let them boil a while in a pot glazed with Nitre, and mingle them, and for every vessel of water pour on an Amphora of wine, and cover all, and after twenty dayes use it: or take honey one pound, as much red wine Tartar, half a pound of Raisins, two Amphoras of Vineger, let them boil in a pot, adde wine also to them, and it will be for drink. I shall adde the Northern drink

Wine called Metheglin.

The drink in Pannonia, Poland and England is more pleasant and wholesome then many wines are; it is made of twenty pound of good honey, and of water one hundred and twenty pound, skimming it till all comes to eighty pound, which being cold and tunned up into a wine vessel, put in leaven of bread six ounces, or as much as will serve to make it work, and purifie it self, and withal put into a bag, that hangs and may be put into the liquor, and not touch the bottom, of Cinnamon, granes of Paradise, Pepper, Ginger, Cloves two drams, one hand full of Elder flowers: let them stand in a wine Cellar all the Winter, in Summer set them fourty dayes in the Sun, till they taste like wine, and the unpleasant taste of the honey be gone. But it will be more pleasant if you add a third part of wine.

CHAP. XXII.

How vineger may be made divers wayes, and of what.

AFter wine it follows to speak of vineger: First, how our forefathers made it; then how of late years, that it may be made extream sowre, which is not only good for a family, but is necessary for many Arts. Also there are some Countries where wine, and so vineger is scarce. Therefore in those places divers men have used their wits to make it: wherefore to begin, we say that

Vineger may be made of the Fig-tree.

Out of *Columella*; A green fig must be taken very betimes, and also if it have rained, and the figs fall to the earth beaten down with showres, gather those figs and put them up in Hogs-heads or Amphora, and let them ferment there; then when it grows sharp, and hath sent out some liquor, what vineger there is strain it out diligently, and pour it into a sweet pitched vessel. This yields the best sharp vineger, and it will never grow musty or hoary, if it be not set in too moist a place. Some to make more quantity, mingle water with the figs, and then they adde to them the ripest new figs, and they let them consume in that liquor, until it tast sharp enough like vineger, then they strain all through rushy baskets, or withie bags; and they boil this vineger till they have taken off all the froth, and filth from it. Then they adde some terrefied salt, and that hinders worms and other vermine to breed in it. *Cassianus* makes it thus: Put into a vessel old figs, terrefied Barley, and the internal parts of Citrons. Stir it often and diligently, and when they are putrified and soaked, strain them out, and use them. *Apuleius*, They make vineger of figs, wet upon the Trees, and cast into water to putrifie, *Dioscorides*, The liquor of figs steeped grows sharp as vineger, and is used for it. There is made also

Vineger of Dates.

To Date wine we speak of, some adde water, and receive it again; and they do this three, four, five or six times, and at last it grows sowre. From the same, *Pliny* teacheth to make

Vineger of honey.

You must wash your honey vessels, or hives in water, with this decoction is made the most wholesome vineger. *Palladius* teacheth the way to make

Vineger

Vineger of Pears.

wild Pears are such as are sharp and ripe, are kept three dayes in a heap, then they are put into a vessel, and fountain or river water is put to them, the vessel is left covered thirty dayes, then as much vineger as is taken out for use, so much water is put in to repair it. *Cassianus* makes

Vineger of Peaches.

Put soft delicate Peaches into a vessel, and adde parched Barley to them, let them putrifie for one day, then strain them out, and use it. We may from *Cassianus* make

Vineger without wine.

If you boil Gypsum and sea-water, and then mingle it with River water, and use it being strained. But if you will

Turn wine into vineger, and contrarily vineger into wine,

Cassianus hath it. He puts Beet roots bruised into wine, it will be vineger when three hours are over. But if he would restore it again as it was, he puts in Cabbage roots. So also

To make the same.

We may do it another way and quickly: Cast into wine, Salt, Pepper and sowre leaven, mingle them and they will soon make it vineger. But to do it more quickly, quench in it often a red hot brick or piece of steel; also provide for that unripe Medlars, Cornels, Mulberries and Plums. But *Sotion* shews to make

Sharp vineger of new wine.

Dry the mother of wine of grapes at the Sun, and put them into new wine, adding a few sowre grapes thereto and it will make sharp vineger that will be for use after seven dayes; or put in pellitory of Spain and it will be sharp. Moreover, if you boil a fourth or fifth part of vineger at the fire, & put that to the rest, and set all eight days in the Sun, you shall have most sharp and pleasant wine. The roots of old grass, and Raisins, and the leaves of a wild Pear tree bruised, and the root of the bramble, and whey of milk, burnt Acorns, Prunes rosted, and the decoctions of Chiches, and pot-sheards red hot, all of these put severally into vineger, will make it tart. *Apuleius* teacheth

To double the quantity of vineger.

Take a good measure of Vineger, about a Metreta, and to that adde one Metreta of Sea-water boiled to half, mingle them and set them aside in a vessel. Some steep Barley, and strain it, and of that juice they mingle one Metreta, and they stir them together, and they cast in torrefied salt when it is yet hot, a good quantity, then they cover the vessel, and let it stand eight dayes. But I use to make it thus,

Vineger of clusters of grapes pressed forth.

After the Vintage, we cast in the clusters when the wine is pressed forth into a wooden vessel, and we pour upon them a quantity of water, and it will be vineger when a week is over. Moreover, we cut the tendrels from Vines, and bruise them, and put water to them, and it will be vineger. Also thus,

Ill wine is turned to vineger.

When the bunches of grapes are pressed forth, lay them between two wooden bowls, not very thick together, let them grow hot for four days; then pour on them so much naughty wine as may cover them, let them alone 24 hours, then strain them into another wooden bowl, and after so many hours, put them into another bowl, and do so til it be turned into most sharp white vineger; and if you would make more of the same clusters, pour on upon them some sharp vineger, and let them alone till they be extream sharp and sowre, then take that out and pour on ill wine, and do as you did. Lastly press those clusters out in a press, and you shall recover as great quantity as of the wine that was spent.

CHAP. XXIII.

How the defects of wine may be managed and restored.

OUr forefathers found out many remedies to preserve wine, and in our dayes we have taken no less pains. For wine is easily corrupted, and takes to it self many strange qualities. *Paxamus* saith, wine either grows sowre or dead about the Solstices, and when the seven stars set, or when the dog star causeth heat, and when it is extream cold, or hot, or rainy, or windy, or when it thunders. We shall shew remedies for all these; First, we shall lay down out of *Africanus*, the signs to know wines that will last, or will corrupt. When you have put your wine into a vessel, after some time change the vessel, and look well on the Lees, for thence shall you know what the wine is, proving it by smelling to it, whether it corrupt, or weevils breed in it, these are signs it putrifies. Others take wine out of the middle of the vessel, they heat it, and when it is cold they taste of it, and they judge of the wine by the savour, some by the smell of the cover; a strong taste is the best sign, a watry the worst, sharpness of duration, weakness of corrupting. The signs must be taken at the times to be feared, we mentioned. But to come to the remedies, we shall shew how

To mend weak wine.

The wine will be weak, when it begins to breath forth that force of heat; for when the soul of it is breathed forth, the wine grows immediately sowre: vineger is the carcasse of wine. Then we may presently prevent it by adding *aqua-vita* to it, for by that it may put on a new soul: the measure will be the fourth part of a pound for a vessel. Another remedy will be

That wine may not grow hot.

In the Summer Solstice wine grows hot by the hot weather, and is spoiled: then put quick-silver into a glass-viol well stopt, and hang it in the middle of the vessel, and the coldness of it will keep the wine from heating. The quantity is two pound for great vessels; for when the air is hot, the external heat draws forth the inward heat, and when that is gone, it is spoiled. We

That wine may not exhale

use this remedy. The vessel being full, we pour oyle upon it, and cover it, for oyle keeps the spirits from evaporating, which I see is now used for all liquors that they may not be perverted. Wines sometimes are troubled: But

To clear wines,

Fronto bids us do thus. Cast three whites of egges into a large earthen dish and beat them, that they may froth; put some white salt to them, that they may be exceeding white, and pour them into a vessel full of wine, for salt and the white of an egge will make all thick liquors clear, but as many Dolia or such measures as there are in the vessel, so many whites of egges must you have, to be mingled again with so many ounces of salt, but you must stir the mixture with a stick, and in four dayes it will grow clear. Also it is done

That wines may not corrupt.

I said that salt keeps all things from corrupting: wherefore for every Dolium, powder one ounce of Allome, and put it into the wine vessel with the wine, for it will keep it from corrupting. The same is done if you put in one ounce of common salt, or half one, half the other: Also brimstone hinders putrefaction. Wherefore if you shall adde to eight ounces of Allome or of

salt

Salt, four ounces of brimstone, you shall do well. The Antients were wont to peserve wine, by adding Salt or sea-water to it, and it would continue along time. *Columella* teacheth thus, when the winds are quiet you must take water out of the deep sea: when it is very calm, and boyl it to thirds, adding to it, if you please, some spices. There are many ordinary things, but we let them pass.

Chap. XXIV.

How Oyl may be made of divers things.

IT is an excellent thing to shew the diversity of ways to make Oyl. That if Olives should ever be scarce, yet we might know how to draw Oyl from many kinds of fruits and seeds. And some of these ways that came from the Antients, yet onely the best and such as are our inventions. Wherefore to begin, We say that

Oyl may be made of Ricinus, call'd Cicinum.

Dioscorides makes it thus. Let ripe Ricini as many as you please, wither in the hot Sun, and be laid upon hurdles: let them be so long in the Sun, till the outward shell break and fall off. Take the flesh of them and bruise it in a morter diligently, then put it into a Caldron glazed with Tin that is full of water: put fire under and boil them, and when they have yielded their inbred juyce, take the vessel from the fire, and with a shell skim off the Oyl on the top, and keep it. But in Egypt where the custom of it is more common: for they cleanse the Ricini and put them into a Mill, and being well grownd, they press them in a press through a basket. *Pliny* saith, They must be boiled in water, and the Oyl that swims on the top must be taken off. But in Egypt where there is plenty of it, without fire, and water sprinkled with Salt, it is ill for to eat, but good for Candles. But we collected them in *September*, for then is the time to gather them, with it parts from a prickly cover and a coat that holds the seed in it; it is easily cleansed in a hot Caldron. The weight of Oyl is half as much as the seed, but it must be twice knocked, and twice pressed. *Palladius* shews how

Oyl of Mastick is made,

gather many Grains of the Mastick-tree, and let them lye in a heap for a day and a night: Then put a basket full of those Berries into any vessel, and pouring hot water thereto, tread them and press them forth. Then from that humour that runs forth of them, the Oyl of Mastick that swims on the top is poured off. But remember lest the cold might hold it there, to pour hot water often on. For thus we see it made with us, and all the Country of Surrentum: also, so is made

Oyl of Turpentine,

as *Damageron* teacheth. The fruit of Turpentine is grownd in a Mill, as the Olives are, and is pressed out, and so it sends forth Oyl. The kernels serve to feed hogs and to burn. Likewise

Oyl of Bays,

Boil Bay-berries in water, the shels yield a certain fat, it is forced out by crushing them in the hands, then gather the Oyl into horns. *Palladius* almost as *Dioscorides*, in *January* boil many Bay-berries, that are ripe and full, in hot water, and when they have boy'ld long, the watry oyl that swims on the top that comes

 from

from them, you shall gently pour off into vessels, driving it easily with feathers. The Indians make as it is said

Oyl of Sesamon.

It is made as we said before, it sends forth excellent Oyl abundantly. There is made

Oyl of the Plane-Tree.

Pliny, For want sometimes they are forced to make Oyl for candles, of the Plane-tree berries soaked in water and salt, but it is very little as I proved. *Pliny* saith the Indians make

Oyl of Chesnuts,

which I think very difficult, for but a little will come from them, as you shall find if you try. He said also, That *Gallia Cisalpina* made

Oyl of Acorns of the Oak

to serve for lights; but we can make very little. Also the Ancients used to make

Oyl of Wallnuts,

that they pressed from the Wallnuts, unsavoury and of a heavy taste: for if there be any rottenness in the kernel, the whole manner is spoil'd. Now *Gallia Cisalpina* makes it for to eat, and for lights also. For lights, by parting the naughty Nuts from the sound; but the best serves for to eat at second courses. These therefore are to eat, and those for lights, they burn cleer, and there is nothing that yields more Oyl. For it turns almost all to Oyl, for one pound of cleansed Nuts will yield almost ten ounces of Oyl. Now follows

Oyl of sweet Almonds.

Oyl of sweet Almonds is best for food, and of bitter, for Physick, and of old it was made with great diligence. *Dioscorides* shews the way how half a bushel of bitter Nuts cleansed and dried, are pounded in a morter with a wooden pestle into lumps, then a sextarius of seething water is poured on, and when for half an hour the moisture is drunk in, they are beaten more violently then before; then is it pressed between boards, and what sticks to the fingers is collected with shells. The Nuts being pressed again, a Hemina of water is sprinkled on them, and when they have drank that up, they do as before; every bushel yields an Hemina. With us it is commonly drawn out the same way. These are the Oyls of the Antients. Now we shall proceed with our Oyls: Next follows

Oyl of small Nuts.

They yield abundance of sweet sented excellent Oyl, which all may use also for meats: one pound of the cleansed Nuts will yield eight ounces of Oyl, which former times were ignorant of.

Oyl of Pistaches

serve for Meat and Physicks. Out of

Pine kirnels Oyl is made

They are cull'd, and the naughty ones serve for lights; but the Oyl that comes from the best, is for to eat, and for Physick; very much is extracted. I saw it at Ravenna. But

Oyl of Beech,

the best of all is pressed out in abundance, for meats and for lights. It burns very cleer, and tastes as sweet Almonds, and the whole Nut almost goes into Oyl, as

as the Wallnut doth. The elder the Mast is, the more Oyl it yields, and the Lees of the Oyl is excellent to fat Oxen and Hogs. They are soon gathered, cleansed, bruised and pressed: We pressed also

Oyl from the bastard Sycomore,

as they call it; for it is abundant in seed, and in winter the boughs of it are seen loaded with seed onely. In *February* we collected it and crumbled it, the shell is broken into six or seven parts, the kernels are like a Pear, they are bruised and heated in a pan, then put into a press, and they yield their Oyl: They make clear light in lamps, and the seed yields a fourth part of Oyl. There is drawn

Oyl out of the Sanguine-Tree

for lights. About the middle of *September* the ripe berries are taken forth of the clusters, let them dry a few days, bruise them, and let them boyl in water in a brass kettle for one hour, then put them into the press, you shall have green coloured Oyl, about a seventh part of the seed. The Mountainous people use it. There is pressed

Oyl out of the Grapes or Raisins,

The Greeks call'd these Gigarta: *Cisalpina Gallia* makes oyl of them, bruised, heat, and pressed in a press, but it is very little fit for lights, because it burns exceeding cleer. There is much in Egypt

Oyl of Radish-seed

made: they use it to season their meats, and boil it with them. But *Cisalpina Gallia* presseth Oyl out of Radish-seed, and Rape-seed: Rapes are pulled up onely in *November*, but they are covered with sand together with their leaves. They are planten in *March*, that they may seed in *May*. For unless they be pulled up, they freeze with winter cold. But there is another kind of Rape that is sowed in *July*; it is weeded, it comes forth in the spring, in *May* it yields seed: out of a quarter of a bushel of it, eighteen pounds of Oyl are drawn; it is good for lights, and for common people to eat. If you sow a whole Acre with this seed, you shall have five load of seed, and of every load you may make two hundred pounds of Oyl: it is onely plow'd and weeded. Also

Oyl is made of the seed of Cameline.

It is made for lights, but those of Lombardy make great plenty of a golden-coloured Oyl of a seed like to this, called Dradella. It hath plaited leaves as wild Rocher, which they sowe amongst Pulse. The same may be said of the seeds of Nettles, Mustard, Flax, Rice.

Chap. XXV.

How a Housholder may provide himself with many sorts of Thread.

NOw shall I speak of many sorts of Yarn, because this may much help the Household, for the Houswife hath always need thereof. Our Ancestors used Hemp and Flax; for thus they made

Yarn of Flax:

yet there needs no example, the Thread is so common. I will speak of those that follow, and of other inventions. *Pliny.* Flax is known to be ripe two ways, when the seed smells, or looks yellow; then it is pulled up and bound in handfuls, and dried in the Sun, letting it hang with the roots upwards for one day: Then five of these bundles standing with their tops one against another, that the seed may fall in the middle. Then after Wheat-harvest, the

the branches are laid in the water that is warm with the Sun, they are kept down by some weight and soaked there, and again, as before, turn'd up-side down they are dried in the Sun. Then being dried, they are bruised on with a flax-hammer; that which was next the rind is call'd hard, or the worst flax, and it is fit for to make weiks for Candles, yet that is kemmed with hackes, till all the membrans be pilled clean. The art of kembing and making of it, is, out of fifty pound of Flax-bundles, to make fifteen pound of Flax. Then again it is polished in Thread, it is often beat upon a hard stone with water, and when it is woven it is bruised again with Beetles, and the more you beat it, the better it is. Also there is made

Thread of Hemp,

Hemp is excellent for ropes. Hemp is plucked up after the Vintage, but it is cleansed and pill'd with great labour. There are three sorts of it, that next the rind is the worst, and that next the pith, the middlemost is the best, which is called Mesa: Another

To make Thread of Broom,

It is broken and pull'd from the Ides of *May*, until the Ides in *June*, this is the time when it is ripe. When it is pull'd, the bundles are set in heaps for two days to take the wind; on the third day it is opened and spread in the Sun, and is dried, and then again it is brought into the house in bundles. Afterwards it is well steep'd in sea-water, or other water where that is wanting. Then being dried in the Sun again, it is watered; if we have presently need of it, if it be wet with hot water in a vessel, it will be the shorter way. But it must be heat to make it good, for the fresh nor sea-water cannot soften it enough. Ropes of Hemp are preferred when they are dry, but Broom is preserved wet, to make good the dryness of the ground it grows on. The upper part of Egypt toward *Arabia*, makes linnen of Cotten. *Asia* makes Flax of Spanish Broom, especially for Fishers nets to last long; the Shrub must be soaked for ten days. And so every Countrey hath its Thread made of divers Plants and Shrubs. We know that there is made

Thread of Nettles,

amongst the Northern people, and it is very fine and white: also there is made

Thread of Aloes in America,

it is hard, white, and most perfect. I shall describe it by their relation, because the extream parts are full of prickles, we strike them off that they may not hinder us, and we cut the branches into long pieces long ways, that the substance under the rind may be the better taken away; then two Poles of wood are fastned in the earth, crossing one the other in the middle like a cross; these are held fast with the left hand, to make them hold fast together, and with the right the foresaid pieces or fillets are taken by one end and drawn over the cross, that the inward part may part from the wooddy part, and the Flax from the substance, and then they are kembed so often, till they become white, pure, nervous, as Fiddle or Harp-strings, then are they washed, dried, and laid up. In thirteen years after that it is planted, the leaves grow very long even twenty foot, the stalk riseth in the middle forty foot long. Then the top is adorned with flowers and bears fruit: I saw this at Rome, and I never remember that I saw any thing more beautiful. I shall now speak of Flax call'd Asbestinum. *Pliny* saith there is Flax also found, That fire will not consume; they call it live-Flax, and I have seen Napkins and Table-clothes burning in the fire, at Feasts, and they were better cleansed of filth with the fire, then they could be by water: Wherefore of this they made Coats for Kings funerals, to keep the ashes of the Body from other ashes. It grows in India in the desarts and scorched places with the Sun, where no rain falls; but there are terrible creatures and serpents, and this is preserved by burning; it is hard to be found, and difficult to wear, because it is so short: when it is found it is as dear as the most precious Pearls. The Greeks call it Asbestinum from the nature of it, So saith *Pliny*, out of which words it is plain that

he

he knew not the Stone Asbestinum, when he said that it was hard to find, and difficult to wear for the shortness of it, for it is kembed and spun by every woman almost, if she be not ignorant of it, as I saw at Venice, a woman of Cyprus and another of Valentia, that shewed me it in great abundance in the Arsenal or Hospital. It is an excellent secret, very rare and profitable, though few knew it of our times: but I have freely communicated it, though it cannot be had, but at great rates.

Chap. XXVI.

To hatch Eggs with out a Hen.

NOw shall I shew how without a Hen, Eggs of Hens and other Birds may be hatcht in summer or winter, so that if any sick people desire to eat Chickens then, they may have them. Birds Eggs are hatched with heat, either of the same Birds or of others, as the heat of man, of the Sun, or fire; for I have seen Hens sit on Geese, Ducks, and Peacocks Eggs, and Pigeons sit on Hen Eggs, and a Cuckow to sit upon any of them. And I have seen women to foster and hatch Eggs between their brests in their bosoms, and under their arm-pits. *Livia Augusta* when she was young and great with childe of *Nero*, by *Cæsar Tiberius*, because she earnestly desired to bring first a boy, she made use of this Omen to try it by, for she fostered an Egge in her bosom, and when she must lay it aside, she put it into her nurses bosom, that the heat might not abate, *Pliny*. But *Aristotle* saith that Birds Eggs, and Eggs of forefooted Beasts are ripened by the incubation of the dam; for all these lay in the earth, and their Eggs are hatched by the warmth of the earth. For if forefooted Beasts that lay Eggs came often where they are, that is more to preserve and keep them then otherwise. And again, Eggs are hatcht by sitting. It is Natures way, but Eggs are not onely so hatched, but of their own accord in the earth, as in Egypt covered with dung they will bring Chickens. *Diodorus Siculus de Egyptiis.* Some are found out by mans industry, by those that keep Birds and Geese; besides, the ways that others have to produce them, that they may have Birds that are strange, and great numbers of them: for Birds do not sit upon their Eggs, but they by their skill hatch the Eggs themselves. At Syracuse a certain drunken companion put Eggs under the earth in mats, and he would not leave off drinking till the Eggs were hatcht. In Egypt about grand *Cayro*, Eggs are artificially hatcht; they make an Oven with many holes, into which they put Eggs of divers kinds, as Goose-eggs, Hen Eggs, and of other Birds; they cover the Oven with hot dung, and if need be they make a fire round about it, so are the Eggs hatcht at their due times. *Paulus Jovius* in his Book of his Histories. In Egypt there is abundance of Hen Chickens: For Hens do not there sit on their Eggs, but they are hatcht in Ovens by a gentle heat, that by a an admirable and compendious art, Chickens are hatcht in very few days and bred up, which they sell not by tale, but by measure. They make the measure without a bottom, and when it is full they take it away. And in the Island of Malta in Sicily, they make an Oven, where into they put Eggs of divers Fowls, as of Hens, Geese, then they make a fire round about, and the Eggs grew ripe at times. But let us see how our Ancestors hatched their Eggs, *Democritus* teacheth

If a Hen do not sit, how she may have many Chickens,

The day you set your Hen upon Eggs, take Hens dung, pound it and sift it, and put it into a hollow vessel with a great belly, lay Hens feathers round about. Then lay your Eggs upright in it, so that the sharp end may be uppermost; and then of the same dung, sprinkle so much on them till the Eggs be covered. But when your Eggs have lain so covered for two or three days, turn them afterwards every day, let not one touch the other, that they may heat alike. But after the twenty day when the Chickens begin to be hatcht, you shall find those that are in the bottom to be crackt round, for this reason you must write down the day they were set, lest you mistake the time: Wherefore on the twentieth day, taking of the shell, put the Chickens into a pen and be tender of them. Bring a Hen to them which is best to order

it: yet I tried this most diligently, and it took no effect, nor can I tell how it should be done. They that commend the Oven, do not teach the manner how it should be done. But what I have done my self, and I have seen others do, I shall briefly relate, that with little labour and without Hens, any one may

Hatch Eggs in a hot Oven.

Make a vessel of Wood like a Hogshead, let it be round, and the Diameter so long as your arm is, that you thrust in, that you may lay and turn the Eggs, let it be four foot in Altitude. This we divide by three boards within into four parts: Let the first be a foot and half, the second little above a foot, the third a foot, and the fourth least of all. Let every concavity divided with boards have a little door thereto, so large as you may thrust in your arm, and its shut to open and shut at pleasure. Let the first and second loft be made of thin boards, or wrought with twigs, let the third be of brass arched, and the fourth of solid wood. Let the first and second stage have a hole in the centre three fingers broad, through which must pass a brazen or iron pipe tinned over, that must come half a foot above the second story, and so in the lower most, but in the bottom the orifice must be wider, like a Pyramis or funnel, that it can fitly receive the heat of the flame of a candle put under it; in the second story let the pipe be perforated about the top, that the heat breathing forth thence, the place may be kept warm, and the Eggs may be hot in the upper part, as they are under the Hen. Above these three rooms strew saw-dust, which I thinks is best to cover them: Let the saw-dust be highest about the sides of the Hogshead, but less in the middle; in the bottom where the pipe is lower, that the Eggs that lye upon it may receive the heat that comes from the pipe every way: In the third story where the pipe ends, let it be pressed down about the sides, and higher in the middle about the pipe, let a linnen cloth cover the saw-dust, a fine cloth, that if it be foul'd it may be washt again, and the Chicken hatcht may go upon it. Lay upon every story a hundred Eggs, more or less, let the great end of the Eggs lye downwards, the sharp end upwards. The walls of the Hogshead that are above the saw-dust within the concavities, and the upper part of the story must be covered with sheep skins, that their warmth may keep in the heat: In the lower concavity under the Tunnel, must a light lamp be placed, at first with two weiks, in the end with three, in summer; but at beginning of winter, first with three, and last with four or five: Let the light fall upon the middle of the Tunnel, that the heat ascending by the pipe, the rooms may heat all alike. The place where this vessel stands must be warm and stand in a by place; in the lower part where the lamp is lighted, you must lay no Eggs, for that heat there will not hatch them. But where the Chickens are wet when they are first hatched, shut them in here to dry them by the warm heat of the lamp, marking twice or thrice every day whether the heat abate, be warm or very hot. We shall know it thus, take an Egg out of the place, and lay it on your Eye, for that will try it well: if it be too hot for you, the heat is great, if you feel it not, it is weak; a strong heat will hatch them, but a weak will make them addle. So you must adde or take away from your lamp, to make the light adequate & proportionable: after the fourth day that the Eggs begin to be warmed, take them out of the cells, and not shaking them hard, hold them gently against the Sun beams or light of a candle, and see whether they be not addle, for if you discern any fibres or bloody matter run about the Egg, it is good; but if it be clear and transparent, it is naught, put another Egg in the place of it: All that are good must be daily turned at the lamp heat, and turn them round as the Hen is wont to do. We need not fear spoiling the Eggs, or if any man do handle them gently; in summer after nineteen or twenty days, or in winter after twenty five or twenty eight days, you shall take the Eggs in your hand, and hold them against the Sun, and see how the Chickens beak stands, there break the shell, and by the hole of the Egg take the Chicken by the beak and pull out its head; then lay it in its place again, for the Chicken will come forth it self, and when it is come out, put it in the lower cell as I said: But let the lamp stand something from the parement, lest the Chickens allured by the light, should pick at it and be burnt by it: And if you do

work

work diligently as I have shewed you, in three hundred Eggs you shall hardly lose ten or twenty at most. But because they are hatcht without the dam, I must shew how to make

A Cock foster Chickens as the Hen doth,

For they would die, if none did keep them. But a Cock or Capon will perform what the Hen should; do but shew him the Chicken, and stroke him gently on the back, and give him meat out of your hands often, that he may become tame. Then pull the feathers off of his brest, and rub him with Nettles, for in a few hours, not to say days, he will take care of the Chickens so well and give them their meat, that no Hen did ever do it, as he will.

THE

THE

FIFTH BOOK

OF

Natural Magick:

Which treateth of Alchymy; shewing how Metals may be altered and transformed, one into another.

THE PROEME.

WE are now come (according to that order which we proposed unto our selves in the beginning) to those experiments which are commonly called by the name of Alchymy matters, wherein not onely a great part of the world is much conversant, but also every one is very desirous to be a practitioner in them, and doth thirst after them with an unquenchable lust. Wherefore we are constrained to speak something concerning this Subject the rather, because many rude and unskilful men, being drawn on, partly by the hope of gain, which they looked for by it, and partly by the pleasure and delight which they did take in it, have bestowed themselves in these experiments to the great slander both of the Art it self, and also of the professors thereof; so that now adays, a man cannot handle it without the scorn and obloquy of the world, because of the disgrace and contempt, which those idiots have brought upon it. For whilst they, being altogether ignorant of the Principles of these things, have labored to make sophistical and counterfeit gold, they have utterly miscarried in their endeavours, and wasted all their substance, and quite undone themselves, and so were deluded by that vain hope of Gold, which set them on work. Demetrius Phalereus *said very well of these men, That which they should have gotten, saith he, they did not get, & that which they had in their own possession, they lost; and so, whereas they hoped to work a metamorphosis or alteration in the Metals, the alteration and change hath lighted heavily upon themselves, in respect of their own estate: and when they have thus overthrown themselves, they have no other comfort left them but onely this, to broach many lies and counterfeit devices, whereby they may likewise deceive others, and draw them into the very same lurches which themselves have before fallen into. And surely the desire partly of the Art it self, and partly of the great gain which many men hoped after by the same, hath filled the world with so many Books, and such an infinite number of lies, that there is scarce any other matter in the like request; so that it was very well done of* Dioclesian *the Emperour, and it was high time for him so to do, to establish a Decree, that all such lying Books that were written concerning that matter, should be cast into the fire and burnt to ashes. Thus was an excellent good Art discredited and disgraced by reason that they abused: which falls out also in many other better things then this is. The Art of it self is not to be set at nought, but rather to be embraced and much to be sought after; especially by such as apply their minds to Philosophy, and to the searching out of the secrecies of Nature: for they shall find in it many things which they will wonder at, and such as are exceeding necessary for the use of men: and when they shall behold the experience of many kinds of transmutations and sundry effects, it will be no small delight unto them; and besides, it will shew them the way to profounder and worthier matters, such as the best and soundest Philosophers have not been ashamed to search into, and to handle in their writings. I do not here promise any golden mountains, as they say, nor yet that Philosophers stone, which the world hath so great an opinion of, and hath been bragged of in many ages, and happily attained unto by some: neither yet do I promise here that golden liquor, whereof if any man do drink, it is supposed that it will make him to be immortal; but it is a meer dream, for seeing that the world it self is variable and subject to alteration, therefore it cannot be but that whatsoever the world yields, should likewise be subject to destruction; so that to promise or to undertake*

take any such matters as these are, it were but rashness and meer foolishness. But the things which we purpose to discourse of and to deliver, are these which hereafter follow; and I would request the Readers to take them in good part, and to content themselves with these; lest if they attempt to proceed to further experiments herein, they prove themselves as foolish and as mad as those which we have spoken of before. These things which here you shall find, I my self have seen, and proved by experience, and therefore I am the bolder to set them abroach to the view of the whole world.

CHAP. I.

Of Tin, and how it may be converted into a more excellent Mettal.

Tinne doth counterfeit and resemble Silver; and there is great amity and agreement betwixt these two Mettals in respect of their colour. The Nature and the colour of Tinne is such, that it will whiten all other Mettals; but it makes them brickle and easie to be knapt in sunder: onely Lead is free from this power of Tinne: but he that can skilfully make a medley of this Mettal with others, may thereby attain to many pretty secrecies. Wherefore, we will endeavor to counterfeit Silver as neer as we can: A matter which may be easily effected, if we can tell how to abolish and utterly destroy those imperfections which are found in Tinne, whereby it is to be discerned from Siver. The imperfections are these: First, it is wont to make a creaking noise, and crasheth more then Silver doth: Secondly, it doth not ring so pleasantly as Silver, but hath a duller sound: Thirdly, it is of a more pale and wanne colour: And lastly, it is more soft and tender; for if it be put into the fire, it is not first red hot before it be melted, as Silver will be; but it clings fast to the fire, and is soon overcome and molten by the heat thereof. These are the qualities that are observed to be in Tinne; not the essential properties of the Nature thereof, but onely accidental qualities, and therefore they may be more easily expelled out of their subject. Let us see therefore how we may rid away these extrinsecal accidents: and first,

How to remedy the softness of Tin, and the creaking noise that it makes.

You must first beat it into small powder, as you shall hereafter be instructed in the manner how to do it; and when you have so done, you must reduce it into one whole body again. And if it do not lose its softness at the first time as you deal so by it, use the same course the second time, and so likewise the third time rather then fail, and by this means you shall at length obtain your purpose: for, by so doing, the Tin will wax so hard, that it will endure the fire till it be red hot, before ever it will melt. By the like practice we may also harden all other soft bodies, to make them red hot before they shall be melted: but the experience hereof is more clear in Tinne then in any other Mettals whatsoever. We may also take away the creaking noise of Tinne, if we melt it seven several times, and quench it every time in the urine of children; or else in the Oyl of Wall-nuts: for this is the onely means to expel that quality and imperfection out of it. Thus then we have declared the manner how to extract these accidents from it: but all this while we have not shewed how it may be transformed into Silver: which now we are to speak of, as soon as ever we have shewed the manner

How to bring Tin into Powder,

which we promised to teach. Let your Tinne boil in the fire; and when it is very liquid, pour it forth into a great morter; and when it beginneth to wax cold, and to be congealed together again, you must stir it and turn it round about with a wooden pestle, and let it not stand still in any case; thus shall you cause it be congealed into very small crums as little as dust: and when you have so done, put it into a very fine ranging sieve, and sift out the smallest of it; and that which is left

behinde in your sieve, because it is too great and not broken well enough, you must put it into the fire again, and use the very same course with it to break it into smaller dust, as you used before; for unless it be throughly broken into powder, it is not serviceable, nor fit for your purpose. Having therefore shewed you how to break your Tin into small crums, as also how to expel out of it those imperfections whereby it is most manifestly discerned from Silver; both which things are very necessary preparatives as it were to the main matter which we have in hand, let us now come to the principal experiment it self, namely

How to alter and transform Tin, that it may become Silver,

You must take an earthen vessel somewhat wide-mouthed; but it must be very strongly and firmly made, that it be throughly able to endure the vehemency of the fire, even to be red hot: Into this vessel put your Tin broken into such small crums as have been spoken of, and therein you must with an iron ladle stirre it up and down continually without ceasing, till it be all on a light fire, and yet none of the Metal to be melted: when you have so done, that you have given it over, and it gathereth together into one body or lump again, you must bestow the very same labour upon it the second time, so long as it may stand in small crums all on a fire for the space of six hours together, without melting. But if some part of the Metal be melted by the vehement heat of the fire, and some other part of it remain not melted, then you must take away that which is melted, and when it is congealed, you must break it into small powder once again, and you must run over your whole labour again with it, even in the same vessel and with the same instrument as before. After this, when you have brought all your Metal to that perfection that it will endure the fire without melting, then you must put it into a glass-fornace where glass is wont to be made, or else into some Oven that is made of purpose to reflex the heat of the fire to the best advantage, and there let it be tormented and applied with a very great fire for the space of three or four days together, until such time as it is made perfectly white as snow: for the smaller that it is broken and beaten into powder, the more perfectly it will take white, and be the fitter for your purpose, and more exactly satisfie your expectation. After all this, you must put it into a vessel that shall be almost full of vinegar, and the vinegar must cover all the Tinne, and swim about three inches above it. There you must distil it, and let the vinegar boil with it so long, till the Tinne hath coloured it, and made it of his own hue, and thickened it into a more gross substance. Then let it stand a while; and when it is throughly settled, pour out that vinegar and put in new, and temper it well with those ashes or crums of Tinne: and this you must do again and again, till all your Tinne be dissolved into the vinegar. If by this often repetition of this labour, you cannot effect such a dissolution, then you must put it once again to the fire in such a fornace, or else into such an Oven as we spake of before, that so it may be reduced into white ashes more exactly and perfectly, whereby it may be the more easily dissolved into vinegar. After this, you must let the vapour of the vinegar be exhaled, and strained out, and the Tinne that is left behinde must be put into a certain vessel where ashes have been wont to be put, and then melt some fine Lead and put amongst it: and because the Lead that is put in will bear up the Tinne aloft, therefore you must make certain little balls or pills compounded of Soap and Lime, or else of Salt-peter and Brimstone, or some other like fat earthy stuff, and cast them in amongst the Lead and Tinne, and they will cause the Tinne to drench it self within the Lead: and by this means, all your Tinne that doth take the Lead, and is incorporated into it by a just proportion and equal temperature, doth become very excellent good Silver. But this is a marvellous hard labour, and not to be atchieved without very great difficulty. You may like wise alter and transform

Tinne into Lead,

An easie matter for any man to effect, by reducing Tinne into ashes or powder often times: for the often burning of it will cause the creaking noise which it is wont to make, to be voided from it, and so to become Lead without any more ado;

ado; especially, if you use a convenient fire, when you go about to reduce it into powder.

Chap. II.

Of Lead, and how it may be converted into another Metal.

THe Antient Writers that have been conversant in the Natures of Metals, are wont to call Tinne by the name of white Lead; and Lead, by the name of black Tinne: insinuating thereby the affinity of the Natures of these two Metals, that they are very like each to another, and therefore may very easily be one of them transformed into the other. It is no hard matter therefore, as to change Tinne into Lead, which we have spoken of in the former Chapter, So also

To change Lead into Tinne.

It may be effected onely by bare washing of it: for if you bath or wash Lead often times, that is, if you often melt it, so that the dull and earthy substance of it be abolished, it will become Tinne very easily: for the same quick-silver, whereby the Lead was first made a subtil and pure substance, before it contracted that soil and earthiness which makes it so heavy, doth still remain in the Lead, as *Gebrus* hath observed; and this is it which causeth that creaking and gnashing sound, which Tinne is wont to yield, and whereby it is especially dicerned from Lead: so that when the Lead hath lost its own earthy lumpishness, which is expelled by often melting; and when it is endued with the sound of Tinne, which the quick-silver doth easily work into it, there can be no difference put betwixt them, but that the Lead is become Tin. It is also possible to transform

Antimony into Lead:

For, that kind of Antimony which the Alchymists are wont to call by the name of Regulus, if it be oftentimes burned in the fire, and be first throughly boiled, it turneth into Lead. This experiment is observed by *Dioscorides*, who saith, That if you take Antimony and burn it exceedingly in the fire, it is converted into Lead. *Galen* sheweth another experiment concerning Lead, namely,

How to procure Lead to become heavier, then of it self it is:

For, whereas he had found by his experience, that Lead hath in it self an æthereal or airy substance, he brings this experiment. Of all the Mettals, saith he, that I have been acquainted with, only Lead is encreased both in bigness and also in weight for, if you lay it up in sellars or such other places of receipt that are under the ground, wherein there is a turbulent and gross foggy air, so that whatsoever is laid up in such rooms shall straightways gather filth and soil, it will be greater and weightier then before it was. Yea, even the very clamps of Lead which have been fastened into carved Images to knit their parts more strongly together, especially those that have been fastened about their feet, have been divers times found to have waxed bigger; and some of those clamps have been seen to swell so much, that whereas in the making of such Images the leaden plates and pins were made level with the Images themselves, yet afterwards they have been so swoln, as that they have stood forth like hillocks and knobs very unevenly, out of the Christal stones whereof the Images were made. This Lead, is a Mettal that hath in it great store of quick-silver, as may appear by this, because it is a very easie mastery,

To extract Quick-silver out of Lead.

Let your Lead be filed into very small dust, and to every two pounds of Lead thus beaten into powder, you must put one ounce of Salt-Peter, and one ounce of ordinary common Salt, and one ounce of Antimony. Let all these be well beaten and powned together, and put into a sieve; and when they are well sifted, put them in-

to a vessel made of glass, and you must fence and plaister the glass round about on the outward side with thick loam tempered with chopt straw, and it must be laid on very fast; and that it may stick upon the vessel the better, your glass must not be smooth, but full of rigoles, as if it were wrested or writhen. When your vessel is thus prepared, you must settle and apply it to a reflexed fire, that is, to a fire made in such a place, as will reflect and beat back the heat of it with great vehemency to the best advantage: and underneath your vessels neck, you must place a large pan, or some other such vessel of great capacity and receipt, which must be half full of cold water: then close up all very fast and sure, and let your fire burn but a little, and give but a small heat for the space of two hours; afterward make it greater, so that the vessel may be throughly heated by it, even to be red hot; then set a blower on work, and let him not leave off to blow for the space of four whole hours together, and you shall see the quick-silver drop down into the vessel that is half full of water, being flighted, as it were, out of the Mettal by the vehement force of the fire. Commonly the quick-silver will stick to the sides of the vessels neck, and therefore you must give the neck of the vessel a little jolt or blow with your hand, that so the quick-silver may fall downward into the water-vessel. By this practice I have extracted oftentimes out of every pound of Mettal almost an whole ounce of quick-silver; yea, sometimes more then an ounce, when I have been very diligent and laborious in performing the work. Another experiment I have seen, which drew me into great admiration,

Lead converted into quick-silver:

A counterfeiting practice, which is the chief cause that all the quick-silver almost which is usually to be had, is but bastard stuff, and meerly counterfeit; yet it is bought and sold for currant, by reason of the neer likeness that it hath with the best. Let there be one pound of Lead melted in an earthen vessel, and then put unto it also one pound of that Tinny mettal which is usually called by the name of Marchasite: and when they are both melted together, you must stirre them up and down, and temper them to a perfect medley with a wooden ladle: In the mean space you must have four pounds of quick-silver warmed in another vessel standing by, to cast in upon that compounded Mettal; for unless your quick-silver be warm, it will not close nor agree well with your Mettals: then temper your quick-silver and your Mettal together for a while, and presently after cast it into cold water; so shall it not congeal into any hard lump, but flote on the top of the water, and be very quick and lively. The onely blemish it hath, and that which onely may be excepted against it, is this, that it is somewhat pale and wan, and not all things so nimble and lively as the true quick-silver is, but is more slow and slimy, drawing as it were a tail after it, as other viscous and slimy things are wont to do. But put it into a vessel of glass, and lay it up for a while; for the longer you keep it, the quicker and nimbler it will be.

CHAP. III.

Of Brass; and how to transform it into a worthier Mettal.

WE will now alledge certain experiments concerning Brass; which though they are but slight and trivial, yet we will not omit to speak of them, because we would fain satisfie the humour of those, who have a great desire to read of and be acquainted with such matters. And here we are to speak of such things as are good to stain the bodies of Mettals with some other colour then naturally they are endued withal. Yet I must needs confess that these are but fained and counterfeit colourings, such as will not last and stick by their bodies for ever; neither yet are they able to abide any trial, but as soon as ever they come to the touchstone, they may easily be discerned to be but counterfeits. Howbeit, as they are not greatly to be desired, because they are but deceivable, yet notwithstanding they are not utterly to be rejected as things of no value. And because there are very few Books extant which

Treat

Treat of any Argument of like kind as this is, but they are full of such experiments and sleights as here offer themselves to be handled by us (for they are very common things, and in every mans mouth) therefore we will in this place speak onely of those things which are easily to be gotten, and yet carry with them a very goodly shew, insomuch that the best and sharpest censure may be deluded and mistaken by the beautiful gloss that is cast upon them; and it may gravel the quickest and skilfullest judgement, to define upon the suddain whether they are true or counterfeit. Yet let them be esteemed no better then they deserve. But this you must know, that as slight and trivial as they are, yet they require the handling of a very skilful Artificer: and whosoever thou art that goest about to practice these experiments, if thou be not a skilful and well experienced workman thy self, be sure to take the advice and counsel of those that are very good Artists in this kind; for otherwise thou wilt certainly miscarry in them, and be defeated of thy purpose. The chief and especial things which are of force to endue Brass with a whiter colour, are these: Arsenick or Oker; that kind of quick-silver which is sublimated, as the Alchymists call it; the scum or froth of silver, which is called by the Greeks Lithargyron; the Marchasite or fire-stone; the Lees of wine; that kind of Salt which is found in Africk under the sand, when the Moon is at the full; which is commonly called Salt Ammoniack; the common and ordinary Salt which the Arabians call by the name of Al-hali; Salt-peter, and lastly Alome. If you extract the liquor out of any of these, or out of all these, and when it is dissolved, put your Brass, being red hot, into it to be quenched, your Brass will become white: Or else, if you melt your Brass, and assoon as it is molten, put it into such liquor, your Brass will become white: Or else, if you draw forth into very small and thin plates, and pown those bodies we now speak of, into small powder, and then cast both the brass that is to be coloured, and the bodies that must colour it, into a melting or casting vessel, and there temper them together to a good medley, and keep them a great while in the fire, that it may be thoroughly melted, the brass will become white. Or else, if you melt your brass, and then cast upon it some of that colouring in small lumps, (for if you cast it in powder and dust, it is a doubt that the force and rage of the fire will utterly consume it, so that it shall not be able to infect or stain the mettal) but if you cast good store of such colouring upon the molten brass, it will endue your brass with a strange and wonderful whiteness, insomuch that it will seem to be very silver indeed. But that you may learn the better, how to work such experiments, and besides, that you may by occasion of those things which are here set down, learn how to compound and work other matters, we will now set forth unto you certain examples, how we may make

Brass to counterfeit Silver;

for when once you are trained up a little in the practice of these matters, then they will sink more easily into your understanding, then by all your reading they can do: therefore as we have spoken of such things as will do this feat, so also we will teach you how to work artificially. Take an earthen pot, and set it upon the fire with very hot coals heaped round about it; put lead into it, and when you see that your lead is molten by the force of the fire, take the third part of so much silver as there was lead, and pown it into small powder, and put it to the lead into the pot; but you must sprinkle it in onely by little and little, that it may be scorched, and even burned as it were by the heat of the fire, and may float like as it were oyle on the top and surface of the lead; and some of it may be so wasted by the vehemency of the heat, that it vanish away into the smoak. Then let them rest a while, so long as there be any remainders of the coals left. After you have so done, break the vessel into pieces, and take away the scum and dross of the mettal; and whereas there will stand on the top of the mettal a certain oyle as it were, or a kind of gelly, you must take that, and bray it in a morter, and cast it into a vessel by little and little where there is brass melted; and though the brass be three times so much in weight as that gelly is, yet the gelly will endue all that brass with a white silver colour; Nay, if there be more then three times so much melted brass put into that mettal, it will make it all like unto silver. But if you would have your brass endued with a

perfect white colour, and not discernable from silver, you must melt some silver and some brass together, and then throw them into the fire, and so take them out again after some short time; for the longer you suffer them in the fire, the worse will your experiment succeed. Which is a matter most worthy to be observed in these cases: for if your work continue any longer in the fire then need requires, it will fade in colour, and the violence of the fire will countermand the operation and effect of your skil and labour in tempering the mettals together, and so the brass will recover his former colour in his first estate. Wherefore let your mettals be kept in the fire as little while as you can, that you may make your brass the whiter, and in colour most like unto silver: howbeit, though you have made it never so white, yet in time it will wax blackish and dim again; for the Arsnick that is naturally incorporated into the brasse, will alwayes strive to restore it to the former duskish and dim colour which it is by nature endued withal. We will now also teach you another way how to make

Brass to counterfeit Silver;

and this is a more excellent and notable experiment then the former. Take six ounces of the Lees of wine, eight ounces of Cristal Arsnick, half an ounce of quick-silver that hath been sublimated, two ounces of Salt-peeter, one ounce and an half of glass; beat all these together in a morter, and see that they be broken into the smallest powder and dust that may be. After this, take three pounds of Copper, that which is commonly called Banda Mediolanensis; this you must have to be drawn out into small thin and slender plates; and when you have thus prepared your mettals and ingredients, you must take of that powder, and sprinkle it into an earthen pot by little and little, and withal put into the same pot your slender plates of Copper; and these things you must do by course, first putting in some of your powder, and then some of your Copper, and afterward some powder again, and afterward some of your little plates again, and so by turns one after another, till the pot be brim-full: then set a cover upon your pot, and plaister it all over singularly well with good stiffe morter that is tempered with chopped straw; then binde it round about with bands and clamps of iron; and truss it up very hard and stiffe together, and then cover it over again with such morter as before. Afterward let the pot be made hot with a great fire round about it. The manner of the heating of your pot must be this; set the pot in a Centre as it were, that the fire may lye as it were in the circumference round about it, to the distance of one foot from the Centre; a little after this, move you fire neerer to the pot, that there may not be above the distance of half a foot betwixt them; then within a while lay the fire a little neerer, and so by little and little let the fire be brought close to the pot, yea and let the pot be covered all over with hot burning coals, within the space of one hour, and so let it stand hidden in the fire for the space of six whole hours together. And after the six hours, you must not take away the coals, but let them go out and die of themselves, and let the pot so stand under them until it be stark cold: and when it is thoroughly cold, break it into pieces, and there you shall find your little thin plates so brittle, that if you do but touch them somewhat hard with your fingers, they will soon be crumbled into dust. When you have taken them out of the pot, you must afterward put them into some casting vessel that is very hard, and durable; and there within half an hour it will be melted: then put into it some of your powder by little and little, till all of it be molten together; then cast it all forth into some hollow place, into some form or mould, that it may run along into rods; and the metal will be as brittle and as easie to be broken into small crumbs, as any Ice can be. After all this, you must melt two pounds of brass; but you must first purifie it and cleanse it a little, by casting upon it some broken glass, and Lees of wine, and Salt-ammoniack, and Salt-peeter, every one of them by turns, and by little and little. When you have thus cleansed it, you must put unto it one pound of that metal which you made of the Copper and powder before spoken of; and you must still sprinkle upon them some of that powder; and after all this, you must take half so much of the best

silver

silver that may be gotten, and melt it amongst the metals before spoken of, and cast them all together into some hollow place like a mould, and so you shall obtain your purpose. But that the surface and the utmost out-sides of the metal may appear white, you must throw it into the fire, that it may be burning hot, and then take it forth, and cast it into that water wherein the Lees of wine and ordinary salt have been liquefied and dissolved; and there let it boil for a certain time, and so shall you make it very white, and moreover so pliant and so easie to be framed and wrought to any fashion, that you may draw it thorough any little hole, yea even thorough the eye of a needle. Furthermore, this is not to be omitted nor buried in silence, for it is a matter of great use, and special force in the colouring of metals, that they be inwardly cleansed and purged of their dross, that they may be thoroughly washed and rid of all such scum and offals, as are incident unto them; for being thus handled, they will be more serviceable and operative for all experiments. As for example; let brass be molten, and then quenched in vineger, and then reduced into powder with salt, so that the more gross and infectious parts thereof be extracted from it; and let it be so handled oftentimes, till there be nothing of its natural uncleanness remaining within it, and so shall it receive a deeper dye, and be changed into a more lively colour. Let the vessel wherein you melt your metals to prepare and make them fit for your turn, be bored thorough in the bottom with sundry holes, that the metal being melted may strain thorough, but the dross, and scum, and offals of it may be left behind, that there may be nothiug but pure metal to be used in your experiments: for the less drosse and offals that your metals have, they are so much the more serviceable for your use in working. Let this therefore be a general rule alwayes to be remembred and observed, that your metals be throughly purged and rid from their dross as much as may possibly be, before ever you entertain any of them into your service for these intendments. There is yet also another way whereby we may bring to pass that

Brass should resemble silver,

and this by Arsnick Orpine, which is an effectual means to accomplish this matter: and whereas in tract of time the metal will somewhat recover it self to its own former paleness and dim colour, we will seek to remedy it and prevent it. Take the best Arsnick Orpine that may be gotten, such as yawns and gapes as though it had scales upon it; it must be of a very orient golden colour; you must meddle this Orpine with the dust of brass that hath been filed from it, and put into them some Lees of wine; but they must be each of them of an equal weight and quantity when you drench them together within the liquor, and so shall it bear a continual orient colour, and glister very brightly without ever any fading at all. After this, take you some silver, and dissolve with that kind of water which is called *Aqua-fortis*: but it must be such as hath in it very little store of moisture; for the most waterish humour that is in it, must be evaporated in some scalding pot or other such vessel, which you must fill up to the brim six or seven several times, with the same water, after the vapours of it have been extracted by the heat of the fire that is under the vessel: when you have thus done, you must mingle your silver that is so dissolved, with the brass filings, and the Arsnick Orpine which we spake of before; and then you must plain it and smooth it all over with the red marble-stone, that the clefts or scales before spoken of, may be closed up; and withal, you must water it by little and little, as it were drop after drop, with the oyle that hath been exprest or extracted out of the Lees of wine, or else out of the firmest Salt-ammoniack that may be had. And when the Sun is gotten up to any strength, that it shews forth it self in very hot gleams, you must bring forth this confection, and let the force of the heat work upon it, even till it be thorough dry: afterward you must supple it with more of the same oyle again, and then let it be dryed up again so long, till that which is remaining do weigh just so much as the silver weighed before it was dissolved. Then close it up in a vessel of glass, and lay it under some dunghil till it be dissolved again, and after the dissolution be gathered together into a Gelly; then

cast

cast into it ten or eight pieces of brass, and it will colour them all, that they shall most lively counterfeit silver. But if you desire

To make brass shew it self of a silver colour, by rubbing it betwixt your hands,

as boyes and cozening companions are oftentimes wont to do, that if they do but handle any vessels of brass, they will make them straightways to glitter like Silver, you may use this devise. Take Ammoniack-salt, and Alome, and Salt-peeter, of each of them an equal weight, and mingle them together, and put unto them a small quantity of Silver-dust, that hath been filed off; then set them all to the fire, that they may be thoroughly hot; and when the fume or vapour is exhaled from them, that they have left reaking, make a powder of them; and whatsoever brass you cast that powder upon, if you do withal, either wet it with your own spittle, or else by little and little rub it over with your fingers, you shall find that they will seem to be of a silver colour. But if you would whiten such brass more handsomely and neatly, you must take another course: You must dissolve a little silver with *Aqua fortis*, and put unto it so much Lees of wine, and as much Ammoniack-salt; let them so lie together till they be about the thickness of the filth that is rubbed off from a mans body after his sweating: then roul it up in some small round balls, and so let them wax dry: when they are dry, if you rub them with your fingers upon any brass or other like metal, and still as you rub them moisten them with a little spittle, you shall make that which you rub upon to be very like unto silver. The very like experiment may be wrought by Quick-silver; for this hath a wonderful force in making any metal to become white. Now, whereas we promised before, to teach you, not onely how to endue brase or such other metal with a silver colour, but also how to preserve and keep the bodies so coloured from returning to their former hiew again, you must beware that these bodies which are endued with such a silver colour, do not take hurt by any sharp or sowre liquor; for either the urine, or vineger, or the juice of limons, or any such tart and sowre liquor, will cause this colour soon to fade away, and so discredit your work, and declare the colour of those metals to be false and counterfeit.

CHAP. IV.

Of Iron, and how to transform it into a more worthy metal.

NOw the order of my proceedings requires, that I should speak somewhat also concerning Iron; for this is a metal which the Wizards of India did highly esteem, as having in it self much goodness, and being of such a temperature, that it may easily be transformed into a more worthy and excellent metal then it self is. Notwithstanding, some there are, which reject this metal as altogether unprofitable, because it is so full of gross earthly substance, and can hardly be melted in the fire, by reason of that firm and setled brimstone which is found in it. But if any man would

Change Iron into Brass,

so that no part of the grosse and earthly substance shall remain in it, he may easily obtain his purpose by Copprcsse or Vitriol. It is reported that in the mountain Carpatus an Hill of Pannonia, at a certain Town called Smolinitium, there is a Lake, in which there are three channels full of water; and whatsoever Iron is put into these channels, it is converted into brass: and if the Iron which you cast into them be in small pieces or little clamps, presently they are converted into mud or dirt; but if that mud be baked and hardened in the fire, it will be turned into perfect good brass. But there is an artificial means whereby this also may be affected; and it is to be done on this wise. Take Iron, and put into a casting vessel; and when it is red hot with the vehement heat of the fire, and that it beginneth to melt, you must cast upon it by little and little some sprinkling of quick brimstone: then you

you must pour it forth, and cast into small rods, and beat it with hammers: it is very brittle, and will easily be broken: then dissolve it with *Aqua-fortis*, such as is compounded of vitriol and Alome tempered together: set it upon hot cinders till it boil, and be dissolved into vapours, and so quite vanish away; and the subsidence thereof, or the rubbish that remains behind, if it be reduced into one solid body again, will become good brass. If you would

Make Iron to become white,

you may effect it by divers and sundry sleights; yet let this onely device content you in this matter. First, you must cleanse and purge your Iron of that dross and refuse that is in it, and of that poysoned corruption of rust that it is generally infected withal: for it hath more earthly substance and parts in it then any other metal hath, insomuch that if you boil it and purge it never so often, it will still of it self yield some new excrements. To cleanse and purge it this is the best way: Take some small thin plates of Iron, and make them red hot, and then quench them in strong lye and vineger which have been boiled with ordinary Salt and Alome; and this you must use to do with them oftentimes, till they be somewhat whitened: the fragments or scrapings also of Iron, you must pown in a morter, after they have been steeped in salt; and you must bray them together till the salt be quite changed, so that there be no blackness left in the liquor of it, and till the Iron be cleansed and purged from the dross that is in it. When you have thus prepared your Iron, you must whiten it on this manner: Make a plaister as it were, of quick-silver and lead tempered together; then pown them into powder, and put that powder into an earthen vessel amongst your plates of Iron that you have prepared to be whitened: close up the vessel fast, and plaister it all over with morter, so that there may be no breathing place for any air either to get in or out: then put it into the fire, and there let it stay for one whole day together, and at length encrease your fire, that it may be so vehement hot as to melt the Iron; for the plaister or confection which was made of lead and Quick-silver, will work in the Iron two effects; for first, it will dispose it to melting, that it shall soon be dissolved; and secondly, it will dispose it to whitening, that it shall the sooner receive a glittering colour. After all this, draw forth your Iron into small thin plates again, and proceed the second time in the same course as before, till you find that it hath taken so much whitenesse as your purpose was to endue it withal. In like manner, if you melt it in a vessel that hath holes in the bottom of it, and melt with it lead, and the Marchasite or fire-stone, and Arsnick, and such other things as we spake of before in our experiments of brass, you may make Iron to become white. If you put amongst it some silver, though it be not much, it will soon resemble the colour of silver: for Iron doth easily suffer it self to be medled with gold or silver; and they may be so thoroughly incorporated into each other, that by all the rules of separation that can be used, you cannot without great labour, and very much ado separate the one of them from the other.

Chap. V.

Of Quick-silver, and of the effects and operations thereof.

IN the next place it is meet that we speak something concerning Quick-silver, and the manifold operations thereof: wherein we will first set down certain vulgar and common congelations that it makes with other things, because many men do desire to know them; and secondly, we will shew, how it may be dissolved into water, that they which are desirous of such experiments, may be satisfied herein. First therefore we will shew

How Quick-silver may be congealed and curdled as it were with Iron.

Put the quick-silver into a casting vessel, and put together with it that water, which the Blacksmith hath used to quench his hot Iron in; and put in also among them Ammoniack Salt, and Vitriol, and Verdegrease, twice so much of every one of these, as there was quick-silver: let all these boil together in an exceeding great fire, and still turn them up and down with an Iron slice or ladle; and if at any time the water boil away, you must be sure that you have in a readiness some of the same water through hot to cast into it, that it may supply the waste which the fire hath made, and yet not hinder the boiling; thus will they be congealed all together within the space of six hours. After this, you must take the congealed stuff when it is cold, and binde it up hard with your hands in leather thongs, or linnen cloth, or osiers, that all the juice and moisture that is in it, may be squeesed out of it; then let that which is squeesed and drained out, settle it self, and be congealed once again, till the whole confection be made: then put it into an earthen vessel well washed, and amongst it some spring-water, and take off as neer as you can, all the filth and scum that is upon it and is gone to waste; and in that vessel you must temper and diligently mix together your congealed matter with spring-water, till the whole matter be pure and clear: then lay it abroad in the open air three days and three nights, and the subject which you have wrought upon will wax thick and hard like a shell or a tile-sheard. There is also another congelation to be made with quick-silver,

Congealing of Quick-silver with balls of Brass,

thus: make two Brass half circles, that they may fasten one within the other, that nothing may exhale: put into them quick-silver, with an equal part of white Arsenick and Tartar well powdred and searced; lute the joynts well without, that nothing may breathe forth, so let them dry, and cover them with coles all over for six hours: then make all red hot, then take it out and open it, and you shall see it all coagulated and to stick in the hollow of the Brass ball; strike it with a hammer, and it will fall off; melt it, and project it, and it will give an excellent colour like to Silver, and it is hard to discern it from Silver. If you will, you may mingle it with three parts of melted Brass, and without Silver; it will be exceeding white, soft and malleable. It is also made another way: Make a great Cup of Silver, red Arsenick and Latin, with a cover that fits close, that nothing may exhale: fill this with quick-silver, and lute the joynts with the white of an Egg, or some Pine-tree-rosin, as it is commonly done: hang this into a pot full of Linseed Oyl, and let it boil twelve hours; take it out, and strain it through a skin or straw; and if any part be not coagulated, do the work again, and make it coagulate. If the vessel do coagulate it slowly, so much as you find it hath lost of its weight of the silver, Arsenick and Alchymy make that good again, for we cannot know by the weight: use it, it is wonderful that the quick-silver will draw to it self out of the vessel, and quick-silver will enter in. Now I shall shew what may be sometimes useful,

To draw water out of Quick-silver.

Make a vessel of potters earth, that will endure the fire, of which crucibles are made six foot long, and of a foot Diameter, glassed within with glass, about a foot broad at the bottom, a finger thick, narrower at the top, bigger at bottom. About the neck let there be a hole as big as ones finger, and a little pipe coming forth, by which you may fitly put in the quick-silver; on the top of the mouth let there be a glass cap, fitted with the pipe, and let it be smeered with clammy clay, and bind it above that it breathe not forth. For this work make a furnace, let it be so large at the top, that it may be fit to receive the bottom of the vessel, a foot broad and deep. You must make the grate the fire is made upon, with that art, that when need is you may draw it back on one side, and the fire may fall beneath. Set therefor the empty vessel into the furnace, and by degrees kindle the fire: Lastly, make the bottom red hot; when you see it to be so, which you may know by the top, you must look through the glass cap; presently by the hole prepared pour in ten or fifteen pounds of quick-silver, and presently with clay cast upon it stop that hole, and

take

take away the grate that the fire may fall to the lower parts, and forthwith quench it with water. Then you shall see that the water of quick-silver will run forth at the nose of the cap, into the receiver under it, about an ounce in quantity: take the vessel from the fire, and pour forth the quick-silver, and do as before, and always one ounce of water will distil forth: keep this for Chymical operations. I found this the best for to smug up women with. This artifice was found to purifie quick-silver. I shall not pass over another art, no less wonderful than profitable for use,

To make quick-silver grow to be a Tree:

Dissolve silver in *aqua fortis*, what is dissolved evaporate into thin air at the fire, that there may remain at the bottom a thick unctious substance; Then distil fountain-water twice or thrice, and pour it on that thick matter, shaking it well; then let it stand a little, and pour into another glass vessel the most pure water, in which the silver is: adde to the water a pound of quick-silver, in a most transparent crystalline glass that will attract to it that silver, and in the space of a day will there spring up a most beautiful tree from the bottom, and hairy, as made of most fine beards of corn, and it will fill the whole vessel, that the eye can behold nothing more pleasant. The same is made of gold with *aqua regia*.

Chap. VI.
Of Silver.

I Shall teach how to give silver a tincture that it may shew like to pure gold; and after that, how it may be turned to true gold.

To give Silver a Gold-colour,

Burn burnt brass with stibium, and melted with half silver, it will have the perfect colour of gold; and mingle it with gold, it will be the better colour. We boil brass thus: I know not any one that hath taught it: you shall do it after this manner: melt brass in a crucible, with as much stibium: when they are both melted, put in as much stibium as before, and pour it out on a plain Marble-stone, that it may cool there, and be fit to beat into plates. Then shall you make two bricks hollow, that the plates may be fitly laid in there: when you have fitted them, let them be closed fast together, and bound with iron bands, and well luted: when they are dried put them in a glass fornace, and let them stand therein a week, to burn exactly, take them out and use them. And

To tincture Silver into gold,

you must do thus: Make first such a tart lye, put quick lime into a pot, whose bottom is full of many small holes, put a piece of wood or tilesheard upon it, then by degrees pour in the powder and hot water, and by the narrow holes at the bottom, let it drain into a clean earthen vessel under it: do this again, to make it exceeding tart. Powder stibium and put into this, that it may evaporate into the thin air; let it boil at an easie fire: for when it boils, the water will be of a purple colour: then strain it into a clean vessel through a linnen cloth; again, pour on the lye on the powders that remain, and let it boil so long at the fire, till the water seems of a bloody colour no more: Then boil the lye that is colour'd, putting fire under, till the water be all exhaled; but the powder that remains being dry, with the oyl of Tartar dried and dissolved, must be cast again upon plates made of equal parts of gold and silver, within an earthen crucible; cover it so long with coles, and renew your work, till it be perfectly like to gold. Also I can make the same

Otherwise.

If I mingle the congealed quick-silver that I speak of with a cap, with a third part of silver, you shall find the silver to be of a golden colour: you shall melt this with the same quantity of gold, and put it into a pot: pour on it very sharp vinegar, and

and let it boil a quarter of a day, and the colour will be augmented. Put this to the utmost trial of gold, that is, with common salt, and powder of bricks, yet adding Vitriol, and so shall you have refined gold. We can also extract

Gold out of Silver,

And not so little but it will pay your cost, and afford you much gain. The way is this: Put the fine filings of Iron into a Crucible that will endure fire, till it grow red hot, and melt: then take artificial Chrysocolla, such as Goldsmiths use to soder with, and red Arsenick, and by degrees strew them in: when you have done this, cast in an equal part of Silver, and let it be exquisitely purged by a strong vessel made of Ashes: all the dregs of the Gold being now removed, cast it into water of separation, and the Gold will fall to the bottom of the vessel, take it: there is nothing of many things that I have found more true, more gainful or, more hard: spare no labour, and do it as you should, lest you lose your labour: or otherwise, let the thin filings of Iron soak for a day in sea-water, let it dry, and let it be red hot in the fire so long in a Crucible, till it run, then cast in an equal quantity of silver, with half brass, let it be projected into a hollow place: then purge it exactly in an ash vessel: for the Iron being excluded and its dregs, put it into water of separation, and gather what falls to the bottom, and it will be excellent Gold. May be it will be profitable to

Fix Cinnaber.

He that desires it, I think he must do thus, break the Cinnaber into pieces as big as Wall-nuts, and put them into a glass vessel that is of the same bigness, and the pieces must be mingled with thrice the weight of silver, and laid by courses, and the vessel must be luted, and suffer it to dry, or set it in the Sun; then cover it with ashes, and let it boil so long on a gentle fire, till it become of a lead colour and break not, which will not be unless you tend it constantly till you come so far. Then purge it with a double quantity of lead; and when it is purged, if it be put to all tryals, it will stand the stronger, and be more heavy and of more vertue: the more easie fire you use, the better will the business be effected: but so shall we try to repair silver, and revive it when it is spoil'd. Let sublimate quick-silver boil in distil'd vinegar, then mingle quick-silver, and in a glass retort, let the quick-silver evaporate in a hot fire, and fall into the receiver: keep it: If you be skilful, you shall find but little of the weight lost. Others do it with the Regulus of Antimony. But otherwise you shall do it sooner and more gainfully thus: Put the broken pieces of Cinnaber as big as dice, into a long linnen bag, hanging equally from the pot sides; then pour on the sharpest venegar, with alom and tartar, double as much, quick lime four parts, and as much of oaken ashes, as it is usual to be made; or you must make some. Let it boil a whole day, take it out and boil it in oyl, be diligent about it, and let it stay there twenty four hours: take the pieces of Cinnaber out of the oyl, and smeer them with the white of an egge beaten, and role it with a third part of the filings of silver: put it into the bottom of a convenient vessel, and lute it well with the best earth, as I said: set it to the fire three days, and at last increase the fire, that it may almost melt and run: take it off, and wash it from its fæces that are left, at the last proof of silver, and bring it to be true and natural. Also it will be pleasant

From fixt Cinnaber to draw out a silver beard.

If you put it into the same vessel, and make a gentle fire under, silver that is pure, not mixed with lead, will become hairy like a wood, that there is nothing more pleasant to behold.

Chap.

CHAP. VII.
Of Operations necessary for use.

I Thought fit to set down some Operations which are generally thought fit for our works: and if you know them not, you will not easily obtain your desire. I have set them down here, that you might not be put to seek them elswhere: First,

To draw forth the life of Tinne.

The filings of Tinne must be put into a pot of earth, with equal part of salt-peter, you shall set on the top of this seven, as many other earthen pots with holes bored in them, and stop these holes well with clay: set above this a glass vessel with the mouth downwards, or with an open pipe, with a vessel under it: put fire to it, and you shall hear it make a noise when it is hot: the life flies away in the fume, and you shall find it in the hollow pots, and in the bottom of the glased vessel compacted together. If you bore an earthen vessel on the side, you may do it something more easily by degrees, and you shall stop it. So also

From Stibium

we may extract it. Stibium that Druggists call Antimony, is grownd small in hand-mills, then let a new crucible of earth be made red hot in a cole fire; cast into it presently by degrees, Stibium, twice as much Tartar, four parts of salt-peter, finely powdred: when the fume riseth, cover it with a cover, lest the fume rising evaporate: then take it off, and cast in more, till all the powder be burnt: then let it stand a little at the fire, take it off and let it cool, and skim off the dregs on the top, and you shall find at the bottom what the Chymists call the Regulus; it is like Lead, and easily changed into it. For saith *Dioscorides*, should it burn a little more, it turns to Lead. Now I will shew how one may draw a more noble Metal

To the out-side,

As foolish Chymists say, for they think that by their impostures they do draw forth the parts lying in the middle, and that the internal parts are the basest of all; but they erre exceedingly: For they eat onely the outward parts in the superficies, that are the weakest, and a little quick-silver is drawn forth, which I approve not. For they corrode all things that their Medicament enters, the harder parts are left, and are polished and whitened: may be they are perswaded of this by the medals of the Antients, that were within all brass, but outwardly seemed like pure silver; but those were sodered together, and beaten with hammers, and then stamp'd. Yet it is very much to do it as they did, and I think it cannot be done. But the things that polish are these, common Salt, Alom, Vitriol, quick Brimstone, Tartar; and for Gold, onely Verdigrease, and Salt Ammoniack. When you would go about it, you must powder part of them, and put them into a vessel with the metal. The crucible must be luted with clay, and covered: there must be left but a very small hole for perspiration: then set it in a gentle fire, and let it burn; and blow not, lest the metal melt: when the powders are burnt they will sink down, which you shall know by the smoke, then take off the cover and look into them. But men make the Metal red hot, and then when it is hot they drench it in: or otherwise; they put it in vinegar till it become well cleansed, and when you have wrapt the work in linnen-rags, that was well luted, cast it into an earthen vessel of vinegar, and boil it long, take it out and cast it into urine, let it boil in salt and vinegar, till no filth almost rise, and the foul spots of the ingredients be gone; and if you find it not exceeding white, do the same again till you come to perfection: Or else proceed otherwise by order: Let your work boil in an earthen pot of water, with salt, alom, and tartar: when the whole superficies is grown white, let it alone a while; then let them boil three hours with equal parts of brimstone, salt-peter, and salt, that it may hang in the middle of them, and not touch the sides of the vessel; take it out, and rub it

with

with sand, till the fume of the sulphur be removed again: let it boil again as at first, and so it will wax white, that it will endure the fire, and not be rejected for counterfeit; you shall find it profitable if you do it well; and you will rejoyce, if you do not abuse it to your own ruine.

CHAP. VIII.

How to make a Metal more weighty.

IT is a question amongst Chymists, and such as are addicted to those studies, how it might be that silver might equal gold in weight, and every metal might exceed its own weight. That may be also made gold, without any detriment to the stamp or engraving, and silver may increase and decrease in its weight, if so be it be made into some vessel. I have undertaken here to teach how to do that easily, that others do with great difficulty. Take this rule to do it by, that

The weight of a Golden vessel may increase,

without hurting the mark, if the magnitude do not equal the weight. You shall rub gold with thin silver, with your hands or fingers, until it may drink it in, and make up the weight you would have it, sticking on the superficies. Then prepare a strong lixivium of brimstone and quick lime, and cast it with the gold into an earthen pot with a wide mouth: put a small fire under, and let them boil so long, till you see that they have gain'd their colour; then take it out, and you shall have it: Or else draw forth of the yelks of eggs and the litharge of gold, water with a strong fire, and quench red hot gold in it, and you have it.

Another that is excellent.

You shall bring silver to powder, either with *aqua fortis*, or calx; the calx is afterwards washt with water, to wash away the salt, wet a golden vessel or plate with water or spittle, that the quantity of the powder you need may stick on the outward superficies.; yet put it not on the edges, for the fraud will be easily discovered by rubbing it on the touch stone. Then powder finely salt one third part, brick as much, vitriol made red two parts: take a brick and make a hole in it as big as the vessel is, in the bottom whereof strew alom de plume: then again pour on the powder with your work till you have filled the hole, then cover the hole with another brick, and fasten it with an Iron pin, and lute the joynts well with clay: let this dry, and let it stand in a reverberating fire about a quarter of a day; and when it is cold, open it, and you shall find the gold all of a silver colour, and more weighty, without any hurt to the stamp. Now to bring it to its former colour, do thus: Take Verdigrease four parts, Salammoniack two parts, salt-peter a half part, as much brick, alom a fourth part; mingle these with the waters, and wash the vessel with it: then with iron tongs put it upon burning coles, that it may be red hot: take it off, and plunge it in urine, and it will regain the colour. If it shine too much, and you would have it of a lower colour, the remedy is to wet it in urine, and let it stand on a plate red hot to cool. But thus you shall make vitriol very red; put it into a vessel covered with coles, and boil it till it change to a most bright red: take it out and lay it aside, and do not use it for an ill purpose. We may with the fragments of brass

Do this business otherwise:

That shall supply the place of silver, and it shall become too weighty: Or otherwise, melt two parts of brass with silver, then make it into small thin plates; in the mean while make a powder of the dregs of *aqua fortis*, namely of salt-peter and vitriol, and in a strong melting vessel, put the plate and the powder to augment gold, fill the vessel in a preposterous order. Then lute the mouth of it, and set it in a gentle fire half a day: take it off, always renewing the same till it come to the desired weight. We have taught how to increase the weight, and not hurt the fashion

or

or stamp. Now I shall shew how without loss in weight, nor yet the stamp being hurt,

Gold and Silver may be diminished:

Some use to do it with *aqua fortis*, but it makes the work rough with knots and holes; you shall do it therefore thus: Strew powder of brimstone upon the work, and put a candle to it round about, or burn it under your work, by degrees it will consume by burning; strike it with a hammer on the contrary side, and the superficies will fall off, as much in quantity as you please, as you use the brimstone. Now shall I shew how

To separate gold from silver Cups that are gilded:

For it is oft-times a custome for Goldsmiths, to melt the vessels and cast them away, and to make new ones again; not knowing how without great trouble, to part the gold from the silver, and therefore melt both together. To part them, do thus: Take salt Ammoniack, brimstone half a part: powder them fine, and anoint the gilded part of the vessel with oyl: then strew on the powder, and take the vessel in a pair of tongs, and put it into the fire: when it is very hot, strike it with an iron, and the powder shaken will fall into the water, in a platter under it, and the vessel will remain unaltered. Also it is done

Another way

with quick-silver: Put quick-silver into an earthen vessel with a very wide mouth, and let it heat so long at the fire, that you can endure the heat of it with your finger, put into it: put the gilt plate of silver into it, and when the quick-silver sticks to the gold, take it out and put it into a Charger, into which the gold, when it is cold, will fall with the quick-silver. Going over this work again, until no more gold appears in the vessel. Then put the gold with the quick-silver that was shaken into the Charger, into a linnen clout, and press it out with your hands, and let the quick-silver fall into some other receiver, the gold will stay behind in the rag; take it and put it into a cole made with a hole in it, blow till it melt, make it into a lump, and boil it in an earthen vessel with a little Stibium, and pour it forth into another vessel, that the gold may fall to the bottom, and the Stibium stay atop. But if you will

Part Gold from a vessel of Brass,

wet the vessel in cold water, and set it in the fire: when it is red hot, quench it in cold water; then scrape off the gold with latin wire bound together.

Chap. IX.

To part Metals without aqua fortis.

BEcause waters are drawn from salts with difficulty, with loss of time and great charges; I shall shew you how to part gold from silver and brass, and silver from brass, without *aqua fortis*; but by some easie operations, with little cost or loss of time: And first I shall shew how

To part Gold from Silver.

Cast a lump of gold mixt with silver into an earthen vessel, that will hold fire, with the same weight of Antimony, thus: when the vessel is red hot, and the lump is melted, and turned about with the force of the fire; cast a little Stibium in, and in a little time it will melt also; and when you see it, cast in the rest of the Stibium, and cover the vessel with a cover: let the mixture boil, as long as one may repeat the Lords-prayer: take away the vessel with a pair of tongs, and cast it into another iron Pyramidal vessel red hot, called a Crucible, that hath in the bottom of it rams fat; shaking it gently, that the heavier part of gold separated from the silver, may

fall

fall to the bottom: when the vessel is cold it is shaken off, and the part next the bottom will be gold, the upper part silver; and if it be not well parted, refuse not to go over the same work again, but take a less quantity of Stibium. Let therefore the gold be purged again, and let the Stibium be boiled, and there will be always at the bottom a little piece of gold. And as the dregs remain, after the same manner purge them again in the copple, and you shall have your silver, without any loss of the weight, because they are both perfect bodies; but the silver onely will lose a little. But would you have your silver to lose less, do thus: adde to two pound and half of Stibium, wine-lees two pounds, and boil them together in an earthen vessel, and the mass will remain in the bottom, which must be also boil'd in a copple; then adding pieces of lead to it, purge it in a copple, wherein the other things being consumed by the fire, the silver onely will remain: but if you do not boil your Stibi m in wine-lees, as I said, part of the silver will be lost, and the copple will draw the silver to it. The same may be done

Another way.

Take three ounces of brimstone, powder them, and mingle them with one ounce of common oyl, and set them to the fire in a glazed dish of earth: let the fire be first gentle, then augment it, till it run, and seem to run over: take it from the fire, and let it cool, then cast it into sharp vinegar, so the oyl will swim above the vinegar, the brimstone will fall down to the bottom; cast away the vinegar, and let the brimstone boil in strong vinegar, and you shall see the vinegar coloured: you shall strain the vinegar through a wisp into a glased vessel, to which adde more brimstone, boil it again, and again strain out the lye into the vessel: doing this so oft, till the Lixivium comes forth muddy, or of a black colour. Let the Lixivium settle one night: again strain it through a wisp, and you shall find the brimstone almost white at the bottom of the vessel: adde that to what you had before, and set it again to boil with three parts as much distilled vinegar, till the vinegar all evaporate and dry the brimstone: take heed it burn not: when it is dry, put it again into distilled vinegar, working the same way so often, until putting a little of it upon a red hot plate of iron, it will melt without flame or smoke. Then cast it on a lump of gold and silver, and the gold will sink to the bottom presently, but the silver will remain on the top. For if brimstone be boil'd in a Lixivium so strong, that it will bear an egg, until it will not smoke, and will melt on a fire-cole: if it be projected on a mass of gold and silver mingled, when they are melted, it will part the gold from the silver. Also there is an ingenious and admirable way

To part silver from brass

with certain powders. The best are those are made of powdred lead, half so much quick brimstone, and arsenick, and common salt double as much, salt-peter one half; powder those fine each by themselves, then mingle them. Take the mixt metal, with half so much more of the powder, and in a vessel that will endure fire, strew it in by turns, and set the vessel fil'd at a strong fire, till all melt; take it out and cast it into another vessel, that is broad atop, narrow at bottom, and hot, as we said, and smeered with ram or sowes grease clarified: let it cool, for you shall find the silver at the bottom, and the brass on the top: part one from the other with an iron rasp, or file: if you will, you may purge your silver again in a copple. But the silver must be made into thin plates, that when it is strewed interchangeably with the powders, they may come at it on all sides: then cover the vessel with its cover, and lute it well. But the salt must be decrepitated that it leap not out, and the brimstone prepared and fixed. But we may thus

Part gold from brass:

Make salt of these things that follow, namely, Vitriol, Alom, Salt-peter, quick Brimstone, of each a pound, Salt-ammoniack half a pound. Powder them all, and boil them in a lye made of ashes, one part, as much quick lime, four parts of beech-ashes: melt them at the fire, and decant them, and boil them till the Lixivium be gone; then

dry

dry it, and keep it in a place not moist, lest it melt; and mingle with it one pound of powder of lead, and strew on of this powder six ounces for every pound of brass made hot in a melting vessel; and let them be shaken, and stirred vehemently with an iron thing to stir it with: when the vessel is cold, break it, you shall find a lump of gold in the bottom. Do the rest as I said.

Chap. X.

A compendious way to part gold or silver from other Metals with aqua fortis.

We shall teach thus compendiously to part gold from silver, and silver from other metals; and it is no small gain to be got by it, if a man well understood what I write: for I have known some by this art that have got great wealth. For example, take a mixture of brass and silver, dissolve it in common *aqua fortis*: when it is consumed, cast fountain-water into it, to remove the sharpness of the water, and that it can no more corrode the metal. Put the water into a great mouthed earthen vessel, and plunge plates of brass therein; for the silver will stick to them like a cloud, the brass is best in the water: put the water into a glass retort with a large belly, and make a soft fire under, and the fountain-water will distil forth by degrees. When you know that the whole quantity of fountain-water is distilled out, or the belly of the retort looks of a yellow colour, and the sent of the salts pierceth your nostrils: take away the receiver, and put another that is empty to it, and lute it well that nothing break forth. Augment the fire, and you shall draw off your *aqua fortis* as strong as before, and the brass will be at the bottom of the retort: The *aqua fortis* will be as good as it was, and you may use it oft-times.

THE SIXTH BOOK OF Natural Magick:

Of counterfeiting Precious Sones.

The Proeme.

FRom the adulterating of Metals, we shall pass to the counterfeiting of Jewels. They are by the same reason, both Arts are of kin, and done by the fire. And it is no fraud, saith Pliny*, to get gain to live by: and the desire of money hath so kindled the firebrand of luxury, that the most cunning artists are sometimes cheated. They are counterfeited by divers ways, either by cutting Jewels in the middle, and putting in the colours, and joyning them together; or else by giving a tincture to Crystal that is all one piece, or counterfeiting Crystal by many ingredients; or we shall attempt to make true Jewels to depart from their proper colour, and all of them to be so handsomly coloured, that they may shew like natural Jewels. Lastly, I shall shew how to make Smalt of divers colours.*

Chap. I.

Of certain Salts used in the composition of Gems.

WE wil first set down certain operations, which are very necessary in the making of Gems, lest we be forced to repeat the same thing over again: And first,

How to make Sal Soda.

The herb Kali or Saltwort is commonly called Soda: grinde this Soda very small, and sift it into powder: put it into a brass Cauldron and boil it, pouring in for every pound of Soda, a firkin of water. Let it boil for four hours, till the water be consumed to a third part. Then take it from the fire, and let it stand twelve hours, while the dregs settle to the bottom, and the water becomes clear: then drain out the water with a linnen cloth, into another vessel, and pour fresh water into the Cauldron: Boil it again, and when it is cold, as before, and all the dross setled, filtrate the clear water out again: Do as much the third time, still having a care to try with your tongue, whether it be still salt. At last, strain the water, and set it in an earthen vessel over the fire, keeping a constant fire under it, until the moisture being almost consumed, the water grow more thick, and be condensed into salt; which must presently be taken out with an iron ladle; and of five pound of Soda, you will have one pound of salt.

How to make Salt of Tartar.

Take the lees of old wine, and dry it carefully; it is commonly called Tartar: put it into an Alimbeck, made in such sort, that the flame may be retorted from the top, and so augment the heat. There let it burn, you will see it grow white; then turn it with your iron tongs, so that the upper part which is white may be at bottom, and turn the back up to the flame: when it hath ceas'd smoaking, take it out, and break part of it, to see whether it be white quite through, for that is an argument of the sufficient burning; because it oftentimes happens, that the outside onely is burned, and the rest of it remaineth crude. Therefore, when it hath gained the colour

lour of chalk, it must be taken out; and when it is cold, grinde it, and lay it in water in some wide-mouth'd vessel a quarter of a day. When the water is grown clear, filtrate it, and strain it into another vessel, and then pour water again unto the settlement, observing the same things we spoke before, until the water have taken out all the salt; which will come to pass in the third or forth time. Pour your waters which you saved, into a vessel of glass; and all things being ready, put live coles under it, and attend the work until the water be consumed by the force of the fire, which being done, the salt will stick to the bottom: it being thus made, preserve it in a dry place, lest it turn to oyl.

Chap. II.

How Flint, or Crystal is to be prepared, and how Pastils are boiled.

THe matter of which Gems are made, is either Crystal or Flint, from whence we strike fire, or round pebbles found by river sides: those are the best which are taken up by the river Thames, white, clear, and of the bigness of an egge; for of those are made best counterfeit Gemms, though all will serve in some sort. Some think that Crystal is the best for this purpose, because of the brightness and transparency of it; but they are deceived. The way of making Gems, is this: Take river-pebbles and put them into a fornace, in that place where the retorted flame is most intense; when they are red hot, take them out and fling them into water: then dry them, and powder them in a mortar, or a hand-mill, until they are very fine; put them into a wide-mouthed vessel, full of rain water, and shake it well in your hands, for so the finest part will rise to the top, and the grossest will settle to the bottom: to that which swims at top pour fresh water, and stir the dust again: and do this oftentimes, until the gross part be quite separated and sunk down. Then take out the water, and let it settle, and in the bottom there will lie a certain slimy matter; gather together, and reserve the refined powder. But whil'st the stone is ground, both the morter and the mill will lose somewhat of themselves, which being mixt with the powder will foul the Gem: wherefore it will be worth the labor to wash that away: to which end, let water be often poured into the lavel, and stirred about; the dust of the morter will rise to the top, by reason of its levity, and the powder of the pebbles will retire to the bottom by reason of its weight; skim the lavel, and separate them with a spoon, till all that sandy and black dust be taken off, then strain out the water, and reserve the powder dry. These being done, we must teach

How Pastils are boiled.

Artificers call those pellets which are made of the salts, and the forenamed powder and water, Pastils. Take five parts of salt of Tartar, as many of salt of Soda; double the quantity of these of the forespoken powder of pebbles, and mix them very well in a stone morter: sprinkle them with water & wet them, so that they may grow into a past, and make Pastils of them in bigness of your fist; set them in the sun, and dry them well. Then put them into a fornace of reverberation, the space of six hours, encreasing the fire by degrees, that at last they may become red hot, but not melt; wherefore use no bellows: when they are baked enough, let them cool, and they will become so hard, that they will endure almost the hammer.

Chap. III.

Of the Fornace, and the Parts thereof.

NOw the Fornace is to be built, which is like to that of glass-makers, but less according to the proportion of the work. Let your fornace be eight foot high, and consist of two vaults; the roof of the lower must be a handful and a half thick: the vault it self must have a little door, by which you may cast in wood to feed the fire

there. Let it also have on the top, and in the middle of its roof, a hole about a foot in breadth, by which the flame may penetrate into the second vault, and reach to the upper roof; whence the flame being reverberated, doth cause a vehement heat. In this upper vault there must be cut out in the wall small holes of a handful in breadth, which must open and shut, to set the pots and pans in on the floor, and to take them out again. Artificers call these pots Crucibles; they are made of clay, which is brought from Valencia, and doth very strongly endure fire: They must be a finger thick, and a foot and a half deep, their bottom somewhat thicker, lest they should break with the force of the fire. All things being thus provided, cast in your wood and fire, and let the fornace heat by degrees, so that it may be perfectly hot in a quarter of a day. Your workmen must be diligent to perform their duty; then let the Pastils, being broken into pieces about the bigness of a wall-nut, be put into crucibles, and set in the holes of the fornace built for that purpose, with a pair of iron tongs to every pot. When they melt, they will rise up in bubbles, and growing greater and greater, must be pricked with sharp wires; that the vapor passing out, the bubbles may sink down again, and not run over the mouth of the crucibles. Then let other pieces be put in, and do as before, until the pots be filled to the top: and continue the fire for a whole day, until the matter be concocted. Then put an iron hook into the pots, and try whether the matter have obtained a perfect transparency: which if it have, take it out of the pots with iron instruments for that purpose, and cast it into clear water, to wash off the filth and stains, and to purge out the salt: for when the Gems are made, on a suddain the salt breaks forth, as it were spued out, and overcast them like a cloud. Yet there must be a great deal of diligence used, whil'st you draw out this vitrified matter, lest it touch the sides of the fornace; for it will cleave thereto like birdlime, hardly to be pulled off without part of the wall: as also lest it fall into the vessels: for it is very difficult to separate it, and it prejudices the clearness of the glass. When it is cold, put it again into the crucibles, and let it glow for two days, until it be concocted into perfect glass. When this vitrified matter hath stood so for two days, some, to make it more fine and bright, lest it should be specked with certain little bubbles (to which glass is very subject) put into the crucible some white lead, which presently groweth red, then melts with the glass and becomes clear and perspicuous. Make your tryal then with an iron hook; for if it be clear of those bubbles, it is perfected, and so will be a perfect mass of Gems. Now we will teach the several Colours, Yellow, Green, or Blue, wherein we will cast our Gems.

Chap. IV.

To make Colours.

While the Crystal is preparing in the fornace, by the same fire the Colours may be also made: And first,

How to make Crocus of Iron:

Take three or four pounds of the limature of Iron, wash it well in a broad vessel; for by putting it into water, the weight of the iron will carry that to the bottom; but the straws and chips, and such kind of filth, will swim on the top; so you will have your filings clean and wash'd. Then dry it well, and put it into an earthen glazed pot with a large mouth, and pour into it three or four gallons of the best and sharpest vinegar: there let it macerate three or four weeks, stirring it every day seven or eight times with an iron rod: then giving it time to settle, pour out the vinegar into another pot, and put fresh vinegar into the iron; and do this, till the vinegar have consumed all the filings. Then put all the vinegar into an earthen vessel, and set it on the fire, and let it boil quite away: In the bottom there will remain a slimy durty matter, mixt with a kind of fatness of the iron, which the fire by continuance will catch hold of: let it burn, and the remaining dust will be Crocus. Others file your rusty nails, and heating them red hot, quench them in vinegar; then

strain

strain them, and dry the rust, and set it again to the fire, till it be red hot, then quench it again with vinegar; this they do three or four times: at length they boil the vinegar away, and take the remaining Crocus from the bottom. Next remains to shew

How to reduce Zaphara into Powder.

A little window is to be made out of the side of the fornace, nigh to which must be built a little cell or oven, so joyned to the mouth of the oven, that the flame may be brought in through a little hole. Let this cell have a little door without, to admit the workmans hand upon occasion. Let this cell be a foot in length and breadth. Set the Saffron upon a Potters tile, into the cell, and shut the door: let it be red hot, and after six hours take it out and put it into water, so will it cleave into pieces; let it be dryed, stamped, and so finely seirced, that it may scarce be felt. But if it cannot be effected with a pestle and morter; pour water upon the powder, and stir it with your hands, and let it settle for a while; then strain it into another vessel, and pour fresh water into the powder; and reiterate this so often, till that which setleth, being beat and brayed, do pass through with water: then dry it, and it will become very fine powder.

How to burn Copper.

Set the filings of Copper, with an equal quantity of salt mixt in an earthen pot, over the fire, and turn it about three or four hours with an iron hook, that it may be burned on all sides: There let it burn a whole natural day: then take it out, and divide it into two parts; lay the one part aside, and set the other with salt on the fire again, for an artificial day: do the same three or four times, that it may be more perfectly calcined, always having a care that it be as hot as may be, but that it melt not. When it is burnt, it is black.

Chap. V.

How Gems are coloured.

All things being thus prepared; there is nothing more, I think, remaineth to make an end of this work, but to know how to colour them. And we will begin with the way

How to dye a Saphire.

Artificers begin with a Saphire: for when it is coloured, unless it be presently removed from the fire, it loseth the tincture; and the longer it remains in the fire, the brighter it groweth. Put a little Zaphara, as they call it, into a pot of glass, two drachms to a pound of glass; then stir it continually from top to bottom with an iron hook: when it is very well mixed, make tryal whether the colour please you or no, by taking a little out of the pot. If it be too faint, adde some more Zaphara; if too deep, put in more glass, and let it boil six hours. Thus you may

Colour Cyanus,

or sea-water, another kind of Saphire. Beat your calcined brass into very fine powder, that you may scarce feel it; for otherwise it will mix with the Crystal, and make it courser: the quantity cannot be defined; for there are lighter and deeper of that kind: for the most part, for one pound one drachm will be sufficient.

How to counterfeit the colour of the Amethist:

To a pound of Crystal, put a dram of that they call Manganess, and so the colour is made. If the Gem be great, make it the paler; if small, make it deeper: for they use such for rings, and other uses.

To counterfeit the Topaze.

To every pound of glass, adde a quarter of an ounce of crocus of Iron, and three ounces of red-lead, to make it of a brighter red. First put in the lead, then the crocus.

The Chrysolite.

When you have made a Topaze, and would have a Chrysolite, adde a little more Copper, that it may have a little verdure: for the Chrysolite differeth from the Topaze in nothing, but that it hath a greater lustre. So we are wont

To counterfeit an Emerald.

This shall be the last: for we must let our work be as quick as possible, because the copper being heavy, when it is mixed with the Crystal, doth presently sink down to the bottom of the pots, and so the Gems well be of too pale a colour. Therefore thus you must do: when you give the tincture to a Cianus, you may easily turn it into Smaragde, by adding crocus of iron, in half the quantity of the copper or brass, *viz.* if at first you put in a fourth part of copper: Now you must adde an eighth part of crocus, and as much copper. After the colours are cast in, let it boil six hours, that the material may grow clear again: for the casting in the colours will make them contract a cloudiness. Afterwards let the fire decrease by degrees, until the fornace be cold: then take out the pots and break them, wherein you shall find your counterfeit precious Stones.

CHAP. VI.

How Gems may otherwise be made.

The manner which I have set down, is peculiar and usual to our Artificers, and by them is also accounted a secret. But I will set down another way, which I had determined always to keep secret to my self; for by it are made with less charge, less time, and less labour, much more refulgent, bright, and livelier Gems, whose superficies and lustre, the salt shall not deface in a much longer time. Although those old counterfeits which are found at Puteoli, in the mortar of ruined houses, and on the shores, are yet very bright, and of a perfect clearness, so that they seem beyond the imitation of our age: Yet I will endeavour by this way, not onely to equal them, but to make much better. Wherefore give ear, and believe: the materials are thus made: Take the comb of a Cock, and cutting his gullet in two, keep the head and the neck. Put it into a pot, and set it in a hard fire; stop it close, that no coles or ashes arising with the smoke, or soote, fall in, and spoil the lustre of it. When the fire is kindled, you will hear it hiss: when it is red hot, take it up with an iron tongs, and quench it in clear water, and dry it: Do this three times, changing the water lest there should be any filth; then grinde it on a marble, till it be so fine that you may blow it about, and reserve it for use. Thence have you the Philosophers Stone, most fragrant in fire, and chief in the triplicity. If thou art ignorant of the Philosophers Stone, learn it from these verses, which I found in an old Manuscript.

Arctus est hominis, qui constat sex elementis.
Cui p si addideris, s. in. m. mutare si bene scis.
Hoc erit os nostrum constans lapis Philosophorum.

Now we have advertis'd you of the materials: let us advise also about the colour. And first of all, I will shew you

How to counterfeit a Topaze.

Put your material into a pot, and cover it with a lid, full of holes; over which there must be laid another, that it may exhale, and yet receive no hurt from the smoke: let it stand in its fornace to the middle the space of a whole day, and it will be a Topaze. Now

To

To counterfeit a Chrysolite,

cram the Cock, and for every ounce give him to eat two grains of the beloved flower of Venus: ſtroak him, and in due time thou ſhalt ſee.

To make an Emarald.

Feed the Cock again, and for every ounce, give him four grains of wheat, and he will ſhine with a moſt bright luſtre. But

To make a Jacinth,

give the Cock graines of the bloody Stone, inſtead of wheat, and he will eaſily lay hold of them.

Chap. VII.

Of Several Tinctures of Cryſtal.

I Have declared divers tinctures of glaſs, and thoſe no vulgar and common ones, but ſuch as are rarely known, and gained, and tried with a great deal of labour. Now I will relate ſome ways of ſtaining Cryſtal, and eſpecially thoſe that are choice, and known to very few; if not onely to my ſelf.

To ſtain Cryſtal with the colour of a Jacinth, or a Ruby, without breaking, or wearing it.

Take ſix parts of Stibium, four of Orpin, three of Arſenick, as much of Sulphur, two of Tutty; beat them all aſunder, and ſift them through a fine ſeirce: put them into a pot: hang your Cryſtal by wires, or cover it over with the powders, and ſo ſet it on the fire, that it may be hot, four or five hours; but uſe no bellows, leſt it break in pieces, or melt. It is a certain ſign of being perfectly coloured, if you take out a piece, and that be of a bright and ſhining colour; otherwiſe deliver it to the fire again, and after ſome time try it again. But you muſt have a great care, leſt it cool too ſuddenly when you take it off the fire, for it will crumble and fall to pieces. If a violet-colour pleaſeth you, take it ſoon from the fire: if you would have a deep purple, let it ſtand longer: we can make a violet with Orpin onely.

To turn a Saphire into a Diamond.

This ſtone, as all others, being put in the fire, loſeth his colour: For the force of the fire maketh the colour fade. Many do it ſeveral ways: for ſome melt gold, and put the Saphire in the middle of it; others put it on a plate of iron, and ſet it in the middle of the fornace of reverberation; others burn it in the middle of a heap of iron duſt. I am wont to do it a ſafer way, thus: I fill an earthen pot with unkill'd lime, in the middle of which I place my Saphire, and cover it over with coals; which being kindled, I ſtop the bellows from blowing, for they will make it flie in pieces. When I think it changed, I take a care that the fire may go out it ſelf: and then taking out the ſtone, I ſee whether it hath contracted a ſufficient whiteneſs; if it have, I put it again in its former place, and let it cool with the fire; if not, I cover it again, often looking on it, until the force of the fire have conſumed all the colour, which it will do in five or ſix hours; if you find that the colour be not quite vaniſhed, do again as before, until it be perfect white. You muſt be very diligent, that the fire do heat by degrees, and alſo cool; for it often happeneth, that ſudden cold doth either make it congeal, or flie in pieces. All other ſtones loſe their colour, like the Saphire; ſome ſooner, ſome later, according to their hardneſs. For the Amethiſt you muſt uſe but a ſoft and gentle fire; for a vehement one will over-harden it, and turn it to duſt. This is the art we uſe, to turn other precious ſtones into Diamonds, which being cut in the middle, and coloured, maketh another kind of adulterating Gems; which by this experiment we will make known: And it is

How to make a ſtone white on one ſide, and red or blew on the other.

I have seen precious stones thus made, and in great esteem with great persons, being of two colours: on one side a Saphire, and on the other a Diamond, and so of divers colours. Which may be done after this manner: For example, we would have a Saphire should be white on one side, and blew on the other; or should be white on one side, and red on the other: thus it may be done. Plaister up that side which you would have red or blew, with chalk, and let it be dryed; then commit it to the fire, those ways we spoke of before, and the naked side will lose the colour and turn white, that it will seem a miracle of Nature, to those that know not by how slight an art it may be done.

How to stain glass of divers colours.

I will not pass by a thing worth the relation, which happened by chance, while we were making these experiments. The flower of Tinne taketh away the perspicuity of Crystal glass, and maketh it of divers colours: for being sprinkled upon Crystal glasses that are polished with a wheele, and set to the fire, it doth variously colour them, and maketh them cloudy; so that one part will look like a stone, and another like an Opale of divers colours. But you must often take it out from the fire, and order it rightly, till it be according to your desire. I have before told you how to make flour of Tinne for the purpose. I will adde somewhat more, indeed no secret, nor very necessary, but that nothing may be omitted by us in this work, *viz.*

How to make a Jacinth

beautiful enough, and not much unlike a true one. Put lead into a hard earthen pot, and set it on the fire in a glass-makers fornace, there let it remain for some days, till the lead be vitrified, and it will be of the colour of a Jacinth.

To counterfeit an Emerald.

You may do this almost in the same manner; and it will resemble the colour of a pleasant green corn. Dissolve silver with strong water, then casting into the water some plates of Copper, as I told you, it will cleave to them. Gather it together, and dry it, and set it into a glass-makers fornace in an earthen pot, within a few days it will become an Emerald. To do the same with other metals, I will leave to the trial of others; it is enough for me to have found out and discovered the way.

To counterfeit Carbuncles.

This we do with Orpin, and use it in some ornaments, for they are brittle, and of a most flagrant colour, have much of the scarlet blush, and cast forth red sparkles. Take four ounces of Orpin, and grinde it small: then put it into a glass vessel, whose bottom you must fortifie against the force of the fire with mortar made with straw, and stop the mouth of it gently. The fire being kindled, the smoke flieth up, and the thinnest part of the material will rise to the top: and you will see it stick to the sides of the glass, and the neck: it will grow bigger by degrees, and new parts still flying up, will make it grow thicker; and like boyling water gather into bubbles, which at last will encrease so big, that they will fall down: Some will stick in the neck of the glass, all of a most flagrant colour, but brittle and small. Break the glass, and take off with a sharp point of a knife, those red congealed bubbles which stick to the glass, and use them. If you would make one great one of those little bubbles; lay a great many little ones upon a piece of glass, and melt them, and they will run into one: a most pleasant sight to see.

CHAP. VIII.

Of making Smalt or Ennamel.

AFter Gems we will endevour to make Smalt or Ennamel. It is a work almost of the same nature, and of the same mixture and colours; this onely difference is between them, that in Gems the glass is transparent, in this it is more dense and solid.

ſolid. In antient times they made their Checker or Moſaique work of it: and Goldſmiths do uſe it in colouring and enammeling gold. It is Tinne that gives it a body and ſolidity.

To make white Enammel,

Take two ounces of Lead aſhes, four of Tinne; and make it into a body, with double the quantity of glaſs: role it into round balls, and ſet it on a gentle fire all night: take heed it ſtick not to the ſides of the pot, but ſtir it about with an iron ſpattle, and when it is melted, increaſe the fire, and the buſineſs is done.

To make black Smalt.

To a pound of glaſs, you muſt adde a drachm of Manganeſs, for ſo it will be of the colour of a Lyon: then adde a drachm of Zaphara, and the mixture will turn black: make often tryal, if it be of a dark purple or violet-colour: for the Tin that giveth it the body, will make it blacker.

To make Smalt of a deep yellow.

You may put to every pound of Cryſtal a little Crocus Martis, and three ounces of Jalloline, as they call it, which engravers uſe: at laſt, Lead and Tin. But if you deſire

To make Smalt of a paler yellow,

Inſtead of Jalloline, adde Jaletto, and you will have your deſire.

To make green Smalt,

Adde burned Copper, and ſo it will be of a deeper colour: but if you deſire it a paler, adde the flakes of Copper, which flie off, while the ſmith hammereth it, being red hot.

To make red Smalt,

Adde the ruſt of iron, very finely beaten: but when you would make

Smalt dark on one ſide, and tranſparent on the other,

Make your Paſtils of earth, and double as much glaſs; ſet it a whole night in the fire of reverberation, and let it melt in a convenient veſſel, ſtirring it with an iron rod: ſo you ſhall perceive both tranſparent and opacous parts in the ſame little Orb. So

To make Smalt of the colour of an Amethiſt.

It is done with nothing but Manganeſs: and if you would have it of a deeper colour, adde more of the body, that is, of the flower of Lead and Tin.

To make Smalt of skie-colour.

It may be effected with Zaphara, by adding ſomewhat more of the body.

To make ſpeckled Smalt,

which being full of ſmall ſpecks, ſhall ſeem to be compounded of a great many lice, very pleaſant to behold. The opacous Smalt being made, pour it upon marble, and then preſently ſprinkle ſome Crocus upon it, or drop ſome pale colour in ſpecks, all over it, and you ſhall have your deſire.

To make Smalt of two colours,

caſt Smalt firſt of one colour upon a marble, as before; and preſently after, ſome of another colour upon that: then with an iron rod preſs them cloſe, and joyn them together.

To make the beſt kind of Smalt,

ſuch as Goldſmiths uſe; to every pot allow two roles of Sal Soda, and ſome ſand, of which glaſs is made, and it will be much more perfect.

CHAP. IX.

To make Smalt of a clear rose-colour.

THe most skilful glass-makers do labour very much, in colouring Smalt of a rose-colour; which is commonly called Rossiclere: seeing that in former times they did it most beautifully and artificially. I will set down what both I my self have done in it, and what I have received from other friends: I have performed the best I could, to shew others an opportune way of making better. The manner is this: cast ten pounds of Crystal in a pot, and when you know it to be well melted, adde a pound of the best red lead, by half at a time, stirring it with an iron rod as fast as you can; for the weight of it will make it sink to the bottom: when it is well mixed, take it out of the pot with iron instruments fit for the purpose, and cast it into water: do this thrice: then mix with it five ounces of Tin calcined, and Cinnabaris of a most bright colour; and so stirring them about for three hours, let them stand a while. When this is done, adde moreover three ounces of vitrified Tin, and beat them together without any intermission, and you will see a most lively rose-colour in the glass, which you may use in enamelling Gold.

To make Glass of Tin.

Set a pound of Tinne in a strong earthen pot, into the fire: let it heat and melt; then remove it with iron tongs into the hottest flames of the glass-makers fornace, for three or four days. Afterwards, the pot being taken out, and cold; break it, and in the top you will find glass of a saffron colour, not clear: but the longer it standeth in the fire, the perfecter it will grow; neither have I known better in this kind, of those many that I have tryed. It must be reduced into fine powder: for the which not onely a morter and mills will be requisite, but also a Porphyrian stone. If it be too florid, you may make it of a more faint colour, by adding glass to it.

Another way to make it.

This is onely for friends: Take nine parts of burnt Tinne, seven of Lead, two of Cinnabaris; of Spanish-soder and Tartar, one part and a half; of the Blood-stone one part, of Painters red a fourth part. And do with it, as in the former.

CHAP. X.

Of leaves of Metal to be put under Gems.

THere are certain leaves of Metal laid under Gems, which being perspicuous, are thereby made paler or deeper, as you will: for if you would have them of a fainter colour, you must put under them leaves of a more clear brightness: if of a deeper, leaves of a darker hue. Moreover, Gems being transparent, are seen quite through, and discover the bottom of the ring; which taketh much of their beauty off. This is an invention of later times, who by terminating the transparency of stones, with leaves of a most bright and pleasant colour, do fit and make up, and mend the colour of the stones. I have been very much delighted in this kind of work, and therefore will deliver it particularly. The leaves are to be made either of Copper alone, or of Copper, Gold, and Silver, mixt together. I will speak of those which are made of Copper alone: You must buy at the Brasiers-shops some thin plates of Copper, of the thickness of strong paper, that they may be the easier made thinner, which you must cut into pieces of three fingers in length, and two in breadth; so that a sheet of two pound, will be divided into a hundred and thirty parts: these we must divide again into two parts, that they may be hammered more easily: Take fourty and beat them, as Artificers do gold, when they beat it out into thinne rays. Let the anvile and hammer be smooth and polished, lest the heavy stroaks should make dents in the Copper, and break it. Discontinue your work by turns, so that you may hammer the Copper while it is hot, and prepared by the fire; and put it into

into the fire, when it is cold: for if you do otherwise, it will break in pieces; which you must presently remove from the rest; for those that are broken, will break others. But that they may be the more easier prepared, when they begin to be extenuated, I make use of this invention. There must be prepared two plates of iron, of a hand square, and the thickness of paper.. Double one of them, that it may receive the other within the folds of it: so that they may receive the plates of Copper in the middle, and enclose them on all sides, that they can neither slip out, nor any dust or ashes fall in, to stick to them. When you have thus enclosed the Copper plates, put them into the fire, and heat them; then take them out with iron tongs, and shaking off the ashes, beat them with your hammer till they are cold, and so they will become thin and fine rays. But while you are beating one, set others to heat; and do this eight times over, until you have hammer'd them very thin, and made them fit for your purpose. It will be worth your labor to look often upon them, to see if any be broken in the working, for they will break their fellows. But because they are wont to grow black in the working, and foul, so that they oftentimes deceive the eye; therefore it is fit, that you have a pot of water ready, with an equal quantity of Tartar, and salt in it, and let it boil over the fire: Put into it your rays, and stirre them about continually, till they be boiled white. Then take them out, and wash them in a pot of clear water, till they be very clean: then dry them with a linnen cloth, and then heat them, and beat them on the anvile again, as before, until they spread into rays, as thin as leaf-gold When this work is to be done, the hammer and anvile must be as smooth, and polished, and bright, as a looking-glass; which you may effect in this manner. First of all, hold them to the grinde-stone, wherewith they grinde knives, until they be smoothed and planed: then rub them with fine sand, and Pumice-stone; afterwards glaze them with a wheele, and polish them with a plate of lead, and powder of emerald: if you use any other art, you will but lose your labour. Thus in two days your work will be finished, that is, by heating your plates, eight or ten times, and preparing them, and by whiting them four times at least: Finally, examine them all, whether they be whole, and of a sufficient thinness: so that if any remain too thick, they may again be brought to the hammer and perfected. But I must advertise you, that the thinner they grow, the less time they must lye in the fire, because they will presently melt: and so also in the water, because the salt will eat into them. At last, cut them with sheares into square pieces, that they may be more convenient for use.

Chap. XI.

How leaves of Metals are to be polished.

The plates being thus thinned and finished, we will fall to polishing of them. But first we must provide tools, wherewith to perform it. Take a plate of Copper of a foot in length, and a hand in breadth, most exquisitely burnished, that it may be as smooth as a looking-glass: bow it either with your hand, or a hammer, by little and little, into the form of a semicylinder. Then turn a piece of wood, so that it may be equal, and fit for it in every part, and be received into the convexity of it, where being fastned with four nails at the corners of the plate, it may remain stedfast. Fix this wood upon a little frame, with two bars of a foot height, fastned to the ends of it. Now we will begin to burnish the plates; which must be thus done: provide chalk made into fine powder, after this sort; take some beaten clay, wrap it in a clean and indifferently fine cloth, and put it into a washing-bowl full of water; stirre it about here and there, in the water, that the finest part may be washed through, and the courser remain in the cloth: then put the new chalk into the cloth again; stirre it and strain it till it all pass through the cloth, and then suffer the water to settle, and seirce it through a strainer; onely changing the water, until no gross settlement remain: Then lay the cloth over the mouth of the vessel, which must receive it, and tie it slack on: so strain it, that you may be the more sure, that nothing but what is very fine can pass through: then press out the water, and reserve the chalk. Lay this

 clay,

clay, thus prepared, upon the Copper, and rub it with a poplar stick, till it shine like gold: then wash it with water, over a wide-mouthed pan, that may receive the water. After this, have a blood-stone ready, very well polished, upon a plate of lead, with the dust of Emerald, it will become most exquisitely smooth: therefore, lay your rays of copper upon the copper, and spread it abroad with the thumb of your left hand; then cast on the clay, and pour water on to wash it, and then wipe it off, and let onely the water remain to fasten them upon the copper. Then take into your hands the stone, being fastened to a stick; and polish the plates with it, having a great care that they do not run into wrinkles; for then they are quite spoiled: but when they begin to move, pour on some of the water, and that will fix them again: Continue this, till you have made it all over as bright and smooth as a looking-glass. A token of their perfect polishing is, when no marks of the running of the stone, is seen upon them. Then taking them off from the wood, cast them into a pot of water, until the rest are all finished; and then wrap them in a clean linnen cloth: dry them, and lay them up in boxes, free from all dust, and filth: but bend them like a half-pillar, so that the polished side may be inward; and tie them so with a string.

Chap. XII.

Of building a fornace for the colouring Plates.

Now we will shew how to colour them: but first, let us describe the fornace, wherewith it must be done. Therefore let a Fornace be made of iron plates of a convenient thickness: let it be a foot in height, and as much in the diameter of the length; let it be covered on the top, with a circular plate: In the centre of the roof of it, cut a round hole, a handful in breadth; and set another fornace upon it, of the same length and breadth, and make a hole in that also, which must be set against the other, and joyn them close together. Make a little door in the lower fornace, close to the ground; let it be made with an arch, four fingers wide, and jet out half a foot, like the mouth of an oven, and be joyned in the same manner to the great fornace. Then kindle your coals in another place, until they cease smoking, and with iron tongs cast them into the foresaid fornace: Heat it very well, and let the outward fornace or mouth of the oven be fill'd half way with live coals. These being thus disposed, fall to colouring the plates. And first, I will teach you

How to colour plates with a purple colour.

Take the plates tyed about with thread, as I told you, and fit them upon a pair of iron tongs, which you must fasten at the fore-end with an iron ring, that they may not open: hold them upon the hole of the upper fornace, that they may receive the ascending smoak; and turn them about, until by degrees you shall perceive them gather a purple colour, without any other smoak then what ariseth from the heat of the coals: when you think them coloured enough, remove them from the smoke, and lay them aside.

How to make them of a Saphire colour.

It is done much after the same way: for taking the rays in an iron tongs, and holding them over the hole of the fornace, cast upon the coals through the low arched door, the feathers of a goose, which grow upon her brest, and then lay upon them a red hot iron rod. For the smoke of the feathers, arising through the tunnell of the fornace, will beat upon the rays, and make them of a sky-colour: when the iron rod groweth cold, take another and put in. It is very admirable, how on a suddain these copper rays will change into several colours: wherefore, when they have obtained the colour which you desire, take them off the fornace presently, for otherwise they will alter into another.

How to make them of a silver colour.

Take a little silver, and dissolve it with *aqua fortis*: then pour some fountain-water into

into it, and your copper rays: presently the water will be troubled, and will stick upon the copper like silver fleeces: cast away the water, and wash the silver, and dry it in the Sun; and when it is dry, lay it upon a marble, and mix with it an ounce of Tartar, and as much ordinary salt; grinde them together, till they be well mixed. This being made into powder, lay it on copper, and rub it with your fingers, and it will make it shine like silver: then spread the rays upon the round wood, and the copper; wet them with the water, lay the powder on them, and rub them with your thumbs, that they may become of a silver colour; steep them in water, and levigate them with the blood-stone upon the foresaid copper; then set them in the smoke, and they will shine with a sky-colour.

How to make them of the colour of an Emerald.

It is very difficult, and there scarce is one of very many that will prove right. First, make your rays of a sky-colour, as before; then take those which have not took that colour rightly, and lay two of them upon the hole of the fornace; and through the vault of the little door, fling some leaves of Box upon red hot plates of iron, where they will crackle like bay-leaves, and send up a smoke through the hole, which will colour the rays. But before they come to be of a green colour, they must pass through many other colours, as yellow, red, and sky-colour; but they must continue some time before they obtain a perfect green.

How to make them red, like a Ruby.

Fling some flocks of Scarlet upon the live coles, and lay the thin plates over the hole, and the arising smoke will colour them red.

How to make them of the colour of the Amethist.

When it is made of a sky-colour, it passeth through the colour of the Amethist; take it therefore off in time, and you have your wish.

Chap. XIII.

How rays are to be coloured by a mixture of Metals.

I Will now shew how rays may be coloured by mixture with other metals; which is of more difficulty, but of longer continuance. The former cost but little labour, but they easily lose their colour: these are harder to be made; but keep their colour longer. Take half a pound of copper, and melt it in a melting pot, put thereunto half a crown of gold; and when it is well melted, and mixed, adde some tartar, that when it cooleth, the top of it may be plain and smooth; after it is cold, set it aside. Then take another half pound of copper, and melt it in the same manner; mix a drachm of silver with it, and let it cool: take it out of the pot, and file the out-side of it smooth; for the least crack, or chap, would spoil the work. You may know whether there be any crack within side or without, by this sign; place it in an even poise upon a piece of iron, and strike it with another piece; if it sound equally, and ring clearly, it is whole; if it do jar, it is cracked somewhere. Let your pieces of metal be about a finger in bigness; beat them gently upon the anvile, lest they break somewhere; set them in the fire and season them, and when they are cold, beat them with the hammer into thin rays, as I have said before: if they chance to crack, file off the flaws; and when they have been seasoned twice or thrice, in the fire, have your pot of water ready, prepared with salt and tartar, to whiten them, that you may more exactly find out the craks.

To make them of the colour of a Ruby.

The plates being finished, if you would make them of a ruby colour, do it with flocks of scarlet, as before; but then the rags must be of the mixture of copper and gold.

To make them of the colour of a Saphire or Emerald.

Let the plates be of copper and silver: the Saphire colour is made with goose feathers, but the Emerald with box-leaves, holding them somewhat longer over the fire. And these are the experiments which I have made concerning Gems.

THE

THE SEVENTH BOOK OF Natural Magick:

Of the wonders of the Load-stone.

The Proeme.

WE pass from Jewels to Stones: the chief whereof, and the most admirable is the Load-stone, and in it the Majesty of Nature doth most appear: and I undertake this work the more willingly, because the Ancients left little or nothing of this in writing to posterity. In a few days, not to say hours, when I sought one experiment, others offered themselves, that I collected almost two hundred of principal note; so wonderful is God in all his works. But what wiser and learneder men might find out, let all men judge. I knew at Venice R. M. Paulus *the Venetian, that was busied in the same study: he was Provincial of the Order of servants, but now a most worthy Advocate, from whom I not onely confess, that I gained something, but I glory in it, because of all the men I ever saw, I never knew any man more learned, or more ingenious, having obtained the whole body of learning; and is not onely the Splendor and Ornament of Venice or Italy, but of the whole world. I shall begin from the most known experiments, and pass to higher matters, that it may not repent any man of his great study and accurate diligence therein. By these, the longitude of the world may be found out, that is of no small moment for Saylors, and wherein the greatest wits have been employed. And to a friend that is at a far distance from us, and fast shut up in prison, we may relate our minds; which I doubt not may be done by two Mariners Compasses, having the Alphabet writ about them. Upon this depends the principles of perpetual motion, and more admirable things, which I shall here let pass. If the Antients left any thing of it, I shall put that in by the way: I shall mark some false reports of some men, not to detest their pains and industry, but lest any man should follow them in an error, and so errors should be perpetual thereby. I shall begin with the Name.*

Chap. I.

What is the Name of this Stone, the kind of it, and the Countrey where it grows.

PLato in Ione writes, that *Empedecles* called this stone μαγνῆτιν, but *Lucretius* from the countrey Magnesia.

The Greeks do call it *Magnes* from the place,
For that the Magnets Land it doth embrace.

And the same *Plato* saith, some call it *Heraclius*. *Theophrastus* in his book of Stones calls it ἡράκλειον, that is *Herculeum*, because he found it about the city Heraclea. Others think it denominated from *Hercules*: for as he conquered and subdued all beasts, and men; so this stone conquers iron, which conquers all things. *Nicander* thinks the stone so called, and so doth *Pliny* from him, from one *Magnes* a shepherd; for it is reported that he found it by his hobnail'd shooes, and his shepherds-crook that it stuck to, when he fed his flocks in Ida, where he was a shepherd. But I think it is called *Magnes*, as you should say *Magnus*, onely one letter changed. Others call it Siderites from σίδηρος, that in Greek

Greek signifies iron, and the Latine call it Magnes, Heraclius, and Siderites. *Hesychius* makes the stone Siderites to be different from Herculeus; for he saith, one hath an iron colour, and the other a silver colour. Also *Pliny* from *Sotacus* makes five kinds of it. The Ethiopian, the Magnesian from Magnesia neer Macedonia, as the way lies to the Lake Bœbis, on the right hand; the third in Echium of Bœotia, the fourth about *Alexandria* at Troaderum; the fifth in Magnesia of Asia. The first difference is, whether it be male or female, the next in the colour: for those that are found in Macedonia and Magnesia, are red and black; but the Bœotian is more red then black: That which is found in Troas is black, and of the female kind, and hath no force therefore. But the worst sort is found in Magnesia, of Asia; it is white, and attracts not iron, and is like a Pumice stone. It is certain, that the bluer they are, the better they are. The Ethiopian is highly commended, and it costs the weight in silver. It is found in Ethiopia at Zimirum; for so is the sandy country called. It is a token of an Ethiopick stone, if it will draw another Loadstone to it. There is also a mountain in Ethiopia, not far off, that produceth a stone called Theamedes, that drives away all iron from it. *Dioscorides* describes it thus. The best Loadstone is that which easily draws iron, of a bluish colour, thick, and not very weighty. *Pisanrensis* makes three sorts of them; one that draws iron, another flesh, another that draws and repels iron; very ignorantly: for the fleshy Loadstone is different from this, and one and the same stone draws & drives iron from it. *Marbodeus* saith, it grows amongst the Proglodites and Indians. *Olaus Magnus* reports, that there are mountains of it in the North, and they draw so forcibly, that they have ships made fast to them by great spikers of wood, lest they should draw out the iron nails out of the ships that pass between these rocks of Loadstone. There is an Island between Corsica and Italy, call'd Ilva, commonly Elba, where a Loadstone may be cut forth: but it hath no vertue. It is found in Cantabria in Spain, Bohemia, and many other places.

Chap. II.

The natural reason of the Loadstones attraction.

Because some have written whole Books, of the reason of the Loadstones attracting of iron: lest I should be tedious, which I purpose not to be, I think fit to pass over other mens opinions, especially, because they depend onely upon words and vain cavils, that Philosophers cannot receive them; and I shall set down my own, founded upon some experiments: yet I shall not pass by the opinion of *Anaxagoras*, set down by *Aristotle* in his Book *De Anima*, who by a similitude calls it a living stone, and that therefore it draws iron; and for some other peculiar forces, which might be properly said to proceed from the soul, as you shall see. *Epicurus* would fain give a reason for it, as *Galen* and *Lucretius* report. For, say they, the Atoms that flew out of the iron, and meet in the Loadstone in one figure, so that they easily embrace one the other; these therefore, when they light upon both the concretes of the stone and iron, and then flie back into the middle, by the way they are turned between themselves, and do withall draw the iron with them. *Galen* inveighs against this; for he cannot believe, as he saith, that the small atoms that flie from the stone, can be complicated with the like atoms that come from the iron, and that their embracing can draw such a heavy weight. Moreover, if you put another iron to that which hangs, that will fasten also, and another to that, and so a third and fourth: & the atoms that result from the stone, when they meet with the iron, they flie back, and are the cause that the iron hangs: and it is not possible that those atoms should penetrate the iron, & through the empty pores should rebound unto the former atoms, and embrace others, whereas he saw five iron instruments hang one by the other. And if the atoms be diffused straight forward through the iron, why then do other iron nails stick, fastned but on the sides? for the vertue of it is spread every way: Wherefore if a very little Loadstone should touch many small bodies of iron, and these others, and those others again, and the Loadstone must fill them all; that small stone would even be consumed into atoms. But I think the Loadstone, is a mixture of

stone and iron, as an iron stone, or a stone of iron. Yet do not think the stone is so changed into iron, as to lose its own Nature, nor that the iron is so drowned in the stone, but it preserves it self; and whilst one labours to get the victory of the other, the attraction is made by the combat between them. In that body, there is more of the stone, then of iron; and therefore the iron, that it may not be subdued by the stone, desires the force and company of iron; that being not able to resist alone, it may be able by more help to defend it self. For all creatures defend their being: Wherefore, that it may enjoy friendly help, and not lose its own perfection, it willingly draws iron to it, or iron comes willingly to that. The Loadstone draws not stones, because it wants them not, for there is stone enough in the body of it; and if one Loadstone draw another, it is not for the stone, but for the iron that is in it. What I said, depends on these Arguments. The pits of Loadstone are where the veins of iron are: these are described by *Galen*, and such as deal in Minerals, and in the confines of them both; of the stone and the iron they grow, and the Loadstones are seen, wherein there is more stone, and others in which there is more iron. In Germany a Loadstone is digged forth, out of which they draw the best iron; and the Loadstone, whilst it lies in the filings of iron, will get more strength; and if it be smeered or neglected, it will lose its forces. I oft saw with great delight a Loadstone wrapt up in burning coles, that sent forth a blue flame, that smelt of brimstone and iron; and that being dissipated, it lost its quality of its soul that was gone, namely, its attractive vertue. It is the stink of iron and brimstone, as such who destroy iron by reducing it to a Calx, or use other Chymical operations, can easily try. And I thought that the same soul, put into another body, must necessarily obtain the same faculty.

CHAP. III.

That the Loadstone hath two opposite Poles, the North and South, and how they may be known.

BEcause the effects of the Loadstone are many and divers, I shall begin to distinguish from the effects of it, that the Readers may receive more benefit and direction. The effects of the Loadstone, are of the stone onely, or of the iron touched with the stone, or of them both, the iron and the stone. The simple effects of the stone, are to draw the stone, to respect the Poles of the world, and such like: also they are mixt and compounded. We say therefore first, that the stone hath two points, that stand opposite one to the other, be it in a great or small stone, which we call the Poles: one of them is directed to the North, the other to the South: For if the stone be at liberty, and hangs that it may play, without any impediments from its weight, one part turns freely to the North, and the contrary part to the South. The way to try it is thus: Take a little piece of Cork, or Fennel-gigant, or some other light wood, and make it like a Boat, that it may serve to bear up the weight of the stone. Put the stone into this vessel, that it may be equi-distant from the bottom. Put the Boat into a vessel full of water, that it may move here and there, and find no impediment; let it so alone, and the Boat will never rest, until the point of the stone stand full North, and the opposite point full South. When the Boat stands still, turn it about twice or thrice with your finger, and so it will come again to rest, and return to the same posture; and this shall make you more certain of the North and South Poles of it. There are many more ways to prove it, for letting it hang equally, as in the Mariners Compass; for where it can move of it self freely, it still directs to the same points: and you may do the same if you hang it by a small thread. Hence we may easily learn,

To know which Loadstone is the more perfect.

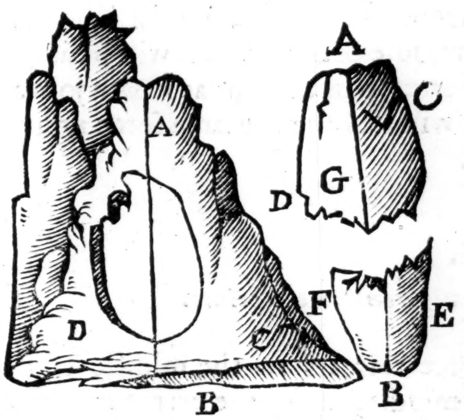
Which a man may easily do by the former trial, and find out what Loadstone is void of vertue, or most forcible. For that Loadstone that doth soonest bring about the Boat to the points, and having found the north Pole, stands still, is certainly the most forcible stone. But that which slowly works, and comes softly about to its place, and stops oft, is more weak and feeble. Also we may be certified another way: for that which can turn about the greater piece of wood, or boat, not slowly, but quickly, is the best stone. And though there be more ways to try it, yet let these suffice at present: we shall speak of the rest in other places

Chap.

CHAP. IV.

The force of the stone is sent by a right line from North to South, through the length of it.

BUt the two points we speak of, are the end of the right line, running through the middle of the stone from North to South; if any man break the stone, and break this line, those ends of the division will presently be of another property and vertue, and will be enemies one to the other: which is a great wonder: for these two points, when they were joined together, had the same force of turning to the pole; but now being parted asunder, one will turn to the North, the other to the South, keeping the same posture and position they had in the Mine where they were bred: and the same happens in the least bits that are seen in the greatest load-stone.

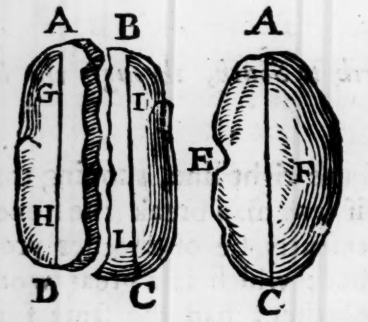


For example: let the rock of Load-stone be ABCD, and let the line from North to South be AB: if we shall cut the stone AB out of the rock, the very line AB in the stone will represent the polar line from North to South. But if we break the stone broad-wayes, every little piece will keep its line. Cut the stone AB broad-ways, as CF, there will be two stones, ACD, and EFB: I say, the stones cut through the line CD, each of them will have its poles of the world. In the stone AGD, the North-pole will be A, the South G. In the stone EFB, the North will be H the South B; and that is beyond all admiration, that the points GH whilst the stone was but one, were but one: as being agreed together, they had the same forces; but when the stone is divided, each part will hold its vertue, and be quite contrary and at enmity: for G alwayes turns to the South, and H to the North, and every bit will have its poles: and if you fit the divided stones with boats, A and H will turn to the North, G and B to the South: and the same will fall out, if you divide AG and HB into many small pieces; and if you afterwards join all these pieces together as they were, their mutual discord of nature will be presently reconciled. Wherefore *Cardanus* said false, that the Load-stone draws where it hath but a thin cover, and more in one part then another: for it attracts onely from one certain point, as it had its position before in the mines.

CHAP. V.

That the polar line in the Loadstone is not stable, but moveable.

BUt the like wonder of nature cannot but be admired amongst many that God hath made, and therefore I would have no man ignorant thereof. This polar line spoken of, is not alwayes certain in the same place, nor doth it stand alwayes firm; but changes, and takes the contrary positions: but this is constant in it, that it alwayes runs through the middle of the stone, like a King that hath alwayes his Court or fort in the midst of his Country: for consisting in the centre from whence the extream parts are as it were the circumference, it can easily send its forces to all parts, and defend it self. But an example shall clear this.



Let the ſtone be AECF, and let the line AC running through the length of it, be the polar line we ſpeak of, wherein the force of it reſides, which runs from the North to the South-pole; I ſay, if you divide the ſtone in two pieces by the line AC, that one piece may be AED, the other BCF, if they be taken aſunder, that the force of it doth not reſide in the extream part of the line AD or BC; but being divided in the middle, the force is received in the middle of each ſtone, and in the ſtone AED, it will be GH, and in BCF, it will be IL: which cannot be ſpoken without admiration, that in a dead ſtone there ſhould be a living vertue to move it ſelf: who is there, unleſs he try it, that will believe theſe things? For as the line that ſtretcheth from North to South was in the prime, ſo if you divide the ſtone into a thouſand parts, that force is ſent into all thoſe parts, each of them holding its own line in the middle of it; ſo if we ſhalldivide the part AED into other parts, and ſhall part the ſmalleſt of them, what part ſoever is parted from its confines, it will have that ſame lively force running long-ways through the middle of it: and ſo it will be, if you divide the ſtone into the ſmalleſt ſand: but the greater wonder is, that if you join all the parts together again as they were at firſt, they will all have the ſame force united, and that will retire into the middle of the ſtone.

CHAP. VI.

That the force of North and South is vigorous in the points.

BUt what is more wonderful? Though the force retreats to the middle of the ſtone, yet it doth not ſend it ſelf forth by the middle, but by the extream parts of the ſtone, and lies ſtill in the middle, as if it were aſleep; but it is awake in the end, and there it comes forth: But if a man break the ſtone, he ſhall ſee it more perfectly. I ſhall give an example for ſuch that are curious, to ſearch out the vertue of the Load-ſtone.

Let the Load-ſtone be AB, and A the North pole, B the South; I ſay that in AB the end of the ſtone, the force is greater, and in the middle of the line ILN, it is more weak and drowſie, unleſs there be any vertue unknown in the right and left ſide CD: but the neerer it is to the North or South, the more it augments; but the farther off it is, the more it faints. Break the ſtone in C and G, wherein there lay hid a vertue unperceived, but it will appear when the ſtone is broken, and ſhew its properties, and one point will ſhew forth the North, the other the South. And if theſe things ſeem ſuperfluous, yet are they neceſſary, as the grounds of what I muſt ſay.

CHAP. VII.

That by the touching of other ſtones, thoſe points will not change their forces.

ANd becauſe I ſaid that the Load-ſtone doth not always hold its forces equal, but that one ſtone is more powerful in operation then another, for ſome are faint and weak; I ſhall put the firſt queſtion, whether by rubbing and touching the weaker ſtones with the ſtronger, thoſe forces will be changed, or ſtay as they were; as, if a

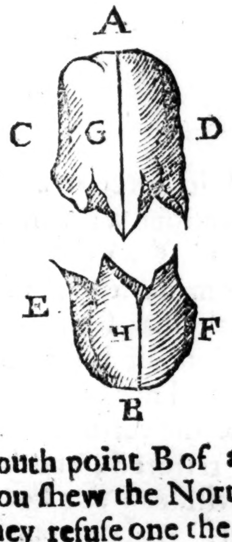
Load-

Load-stone is sluggish in pointing out the pole, whether in a stronger stone rubbed with the North point upon the North point of the weaker, can help it at all; or if we shall rub the South point of the other on the North point of this, whether the North point rubbed on will be gone and become the South point, or continue in its former vertue? Where we have not reason to direct us, experience shall prove it. For let a Loadstone be of what forces and properties it may be, by rubbing it against a Loadstone of less vertue, it will never lose any thing, but continues immutable; and being left at liberty in its boat, it will turn voluntarily to its own pole, and decline the contrary part. And though we cannot find the cause of it, yet it seems not against reason; I say, that in stones of the same kind, the greater stones have the greatest forces; and when one Loadstone is rubbed against another, it will leave certain hairs, which are but the bruised small parts of the stone, that stick like hairs, and these are they that lend force to iron and other things to attract, and to turn to the pole; but if the stone that is rubbed and receives it be greater then those hairs, it can never be that the greater vertue should be conquered by the less, alwayes the stones being of the same kind, since the hairs have as it were no proportion to the magnitude of it. And as the hairs to the stones magnitude are insensible, so it is impossible that they can wrest the force of it to the contrary pole.

Chap. VIII.

That a Loadstone will draw a Loadstone, and drive it from it.

I Shall speak of the other operation of it, which is of its attracting and repelling. This is both admirable, and delightsome to behold with our eyes, and to consider in our mind, that the part of one Loadstone should so carefully search out another, allure and attract it, to enjoy its company, and to foster it in its bosom; and again, another should be such an enemy to it, that they are at mutual discord, so that putting their contrary ends together, the one will be so contrary to the other, and hate as it were the force of it, that it will turn the contrary way: namely, the North part of the one doth not indifferently draw any part of every other stone, but a distinct and certain part; nor doth it drive every part from it, but that part it naturally abhors, and cannot endure, as being contrary unto it. The North part of the one will draw the South part of the other, and drive away from it the North part of the same; and the South part of this is not an enemy to the North part of the other, but to the South part of it. The same will appear better by an example.



Let there be two stones ACD, and EBF: in the first stone let A be the North pole, and the point G the South; in the stone EFB let the North part be H, the South B: I say, if you put the South part G, of the stone CAD, to the South part B, of the stone EFB, it will presently drive it from it; and the same will happen if you put the North pole A to the North pole G. Again, if you shew the North point A to the South point H, or the South point B to the North point A, as being mutually agreed, it will draw the part to it that is not against it. The reason of it I know; for since that the South part G, had formerly been fast to the North part H, when the parts are divided they alwayes seek to unite again, to preserve the same body, as Philosophers say. But if the South point G had been fast with the South point B of another stone, B flies off presently, and departs from it; or if you shew the North point A, to the North point H, the same will come to pass; for they refuse one the other, because they did not so stand in their Mine. Here I shall confute the error of *Pliny*, and of his followers, who think that no other Loadstone hath this vertue but the stone of Ethiopia; but it is common to all Loadstones. Also, it is a sign, saith he, of the Ethiopian stone, because that will draw another

whole Loadstone to it. Also *Cardanus* falsly affirms that one Loadstone will not draw another; but it will draw it, because the iron is concealed in it that it had first drank in. In brief, the poles that are unlike, will join together, by reason of the similitude of their substance, and likeness of inclination; but the poles that are the same, by a contrary inclination are at enmity: that is, the North point seeks the South point, and the South the North point; so shall the South and North points reject South and North points. Yet we must tell you by the way, that when we try the stones, let them not be both great and vast stones, that being hindered by their weights cannot perform their office: but let one be great, and the other small; or both small, that they may be mutually repulsed or drawn on. The trial is easie, if they be hanged by a thread, or put into their boats, or if they play equally balanced upon the needle.

CHAP. IX.
A sport of the Loadstone.

I Will not pass by a merry conceit of the Loadstone, that I have oft-times made my friends sport with, for the good of those that are curious in the search of the reasons of things. How in a short time two kinds of sands mingled, and laid on a heap, may be parted one from the other very suddenly: for the standers by, that cannot sound the reason of it will, think it impossible. The trick is this: Pown a Loadstone into very fine sand, and put some white sand, or some other sand together with it, and mingle them, and make a heap of them: for if you put a Loadstone to it, either uncovered, or covered with linen (that the standers by may not know it) presently the sand of the Loadstone, as in league with it, will run like small hairs joined together, and will stick fast to the stone; which you may brush off and lay aside, then come again, and what is behind will run to the stone, till you have drawn it all out; and it will cause no little wonder, that when the Loadstone comes to the heap, the sands that were mingled should be parted asunder. But the more easily to powder the Loadstone, do thus. Put the Loadstone into an iron morter, lay a blanket or some other soft thing upon it, for it will thus yield to hand-strokes, and presently crumble; if not, you must beat hard on the bottom of the morter, and batter the pestle. Also the same thing befals us in a certain sand that is brought to us out of an iron Mine from Porchys, for it hath the colour and shining that iron hath; and by the proximation of the Loadstone, it is soon parted from the other, to the admiration of those that are present. It may be this experiment was made, because the antients report that the Loadstone will draw iron, sand, oyle, and all things.

CHAP. X.
The greater the Loadstone is, the greater is the force of it.

AND you must know, that the bigger Loadstone will cast forth its force at a farther distance, and brandish it, and attract the opposite Loadstone with more violence, and draw it to it, and that in the same sort of stone; as if a Loadstone be a pound weight, and another Loadstone be a good distance from it, it will presently leap, and meet the other that draws it. If we cut off half that stone, the force of it will decay, and be dull as if it were dead, and the vigor of it is taken away by the proportion of the part taken from it. If any man will not believe it, let a stone be fetcht for trial; for a part being taken away, part of the vertue is lost also: join the part taken away as it was, and the force will be restored, and become more lively, and will be as powerful as formerly, that it will leap at a Loadstone that meets it at a great distance, and presently embrace it. This argument confirms it, that the greater the stone is, the greater force it hath, even in the same sort of stones: for I have seen divers Loadstones, brought from divers parts of the world

world, to have divers properties. I saw at Rome, a Loadstone weighed an Ounce, that drew two Ounces of Iron, and held it so fast as it drew, that it could scarce be pulled from it. I have seen others of forty Pound weight, that were so feeble, that they would scarce stir an Ounce. But that I may the more oblige the curiosity of Students in this matter, I shall teach in the following Chapters, how the Vertue of the Stone may be tried and equally balanced.

Chap. XI.

That the force of this Stone will pass into other Stones, that sometimes you may see as it were a rope of Stones.

THe Stone with us is commended for another property; for when it hath taken hold of another Stone, it not only holds that fast, but it sends into the Body of it an effluxion of its forces; and that having got more forces, draws another, and gives it the like faculty: the third made to partake of the same vertue, draws others that are neer or far off, and casts forth and brandisheth the same vertue; and this draws another: and so, by a reciprocal ejaculation, by the same force it is held, by the same it holds others; and from each of them to the other, are their darts flying, as it were endowed with the vertue of them: and if you lift them up on high, they seem to hang in links like a Chain, that they will not easily be drawn one from the other; that we must needs wonder exceedingly, how that internal and invisible force can run from one to the other, and pass through them: and the more vertue it hath, to the more it doth communicate it. Yet I thought fit to forewarn you that you fail not in your trial, that the Stones must stick the one to the other by the parts that agree, and not by contrary parts; for so would not one impart his vertues to another, but by the meeting with an opposite part, would be held back, and cease from doing its Office; namely, that the North point of the one, must stick to the South point of the other, as I said; and not contrarily: for the South point applied to the South, and the North point to the North point, is contrary; and the faculty will faint and decay at the presence of its Adversary. Nor yet will we omit to remember those that are curious to try this, that the Stones must successively be proportionable, that the great one must draw a less, and a little one must draw one less then it self: for so they will hang the faster, and not be so easily pulled asunder.

Chap. XII.

That in the Loadstone that hairyness is contused.

HEnce comes that hairiness of little Hairs, that we mentioned before, that sticks so fast to the Stone, that it can hardly be pulled off: for when one is rubbed against the other, or is beaten off with a light blow of the Hammer, those small pieces being rubbed one against another, do not fall to the Earth by their own weight, but are held up by the force of the Stone: and that one may stick fast to the other, turning its friendly countenauce to it, it can by no other means commodiously fasten to its sympathizing part, nor be joyned with it, but like a Hair or small Threed; and if you rub one Stone long against another, that heap of Sand will so augment, that it will appear all hairy, or like the down on a mans chin, or as it were beset round with a heap of pricks. Nor is this to be passed without admiration, That if any man puts another Loadstone to it, or neer it, that is greater then it, and more powerful; they will appear presently to turn about, and to direct their friendly parts to the like parts in the Stone that is put neer them, and to strive to come to it; and if they cannot do it, for want of strength, they will fall to the ground.

CHAP.

CHAP. XIII.

The attractive part is more violent then the part that drives off.

WE must tell the Reader of another thing before-hand, that having laid the foundation of what we shall say, we may proceed to greater matters. The part that attracts, draws more vehemently; and that which drives away, doth it more faintly; namely, the part opposite to it: for if the South part of the Stone, stick to the North part of the other, it will draw at greater distance and more force: but contrarily, if you turn the disagreeing parts together, namely, the South parts to the South, and the North parts to the North parts, the natural force is made dull, and as though it were feeble and weak, it loseth its force, that it cannot so well perform its Office; and if they be not very neer, the force is stopped, and can do very little. If any man desires to try, let him hang them up with threads, or balance them on a pin, or put them in Boats, and he shall finde their readiness to draw, and their feebleness and sluggishness to drive off from them.

CHAP. XIV.

The contrary parts of the Stones are contrary one to another.

THe parts we speak of, if they be joyned friendly together, they will as it were, enter a league, and help one the other, and will gain more force and vertue. But if they be contrary, they are at such opposition by their Nature, and such secret hatred there is between them, that being put together by their disagreeing points, as if their Adversary were present, they will cease from all their attraction, and lose all their force. As, if you have Loadstones in your hands, that have the opposite parts united, the North and South together; if another stone be put to them, neither of these stones will move or get the Victory; for they neither draw to, nor drive from; especially, if both their forces be equal. But if one be stronger then another, the stone that is put to it, will move and stir, and will either come forward or go backward. But if you take up his contrary Companion, he will either be drawn after, or will flie from it willingly; for it will either go along with the part it agrees with, or will go from that part it is contrary to: by which Reason you may know, that one hinders the other. We may also by another Experiment, be made more certain of the same thing: If you draw one Loadstone with another, and let it hang in the Air; if to the place where they joyn, you apply the contrary force of another Loadstone; by this meeting with their Enemy, both their forces will fail and faint: and if the same be of a great force, the stone that drew will let the other go, and falls from it. And also, not without mirth and admiration, you shall see a Chain of many pieces of Loadstones hanging together: and if you apply the contrary side to the third or fourth stone, the Chain is presently broken, and the part falls off, and will not hang fast: but the other parts, whither the force of it comes not, will yet stick fast together in a Link, unless you put the end of the contrary part to them.

CHAP. XV.

How to know the Polar points in the Loadstone.

VVE may know by another and more certain way then that I set down before, which are the vertical points in the Loadstone, which turn to the North, which to the South; and especially, that point that sends forth the attractive vertue, will be discovered. Thus: That point that most vehemently draws unto it the

the South point of another stone, and sticks fast to it, that is the North point; and that point the North part of another stone willingly joyns with, is the South point. The same also may be known by the driving off: That point that drives off from it, and refuseth the North part of the stone put against it, is the North point; and the South point, that drives from it the South point. And he that would have the true pole more exactly demonstrated, let him do thus: Put a little bit of a Loadstone, not much greater or lesser then a Millet-Seed, to the Loadstone; and if it presently draw it at a distance, and when it is drawn, it sticks fast and is hardly taken from it, it is an Argument of the true end whence that force proceeds. You may also draw about a little bit about that point, to see if it will draw weakly or strongly, and whether it will part from that place of it self, or unwillingly. Briefly, That point that draws with most force, and will hardly let loose what it hath attracted, is the true point of attraction; giving you to understand,

That the Pole sends its force to the Circumference.

I have known it so, as from the Centre to the Circumference. And as the light of a Candle is spread every way, and enlightens the Chamber; and the farther it is off from it, the weaker it shines, and at too great a distance is lost; and the neerer it is, the more cleerly it illuminates: so the force flies forth at that point; and the neerer it is, the more forcibly it attracts; and the further off, the more faintly: and if it be set too far off, it vanisheth quite, and doth nothing. Wherefore for that we shall say of it, and mark it for, we shall call the length of its forces the compass of its vertues.

Chap. XVI.

That the force of drawing and driving off, can be hindred by no hindrance.

But this is above all wonder, that you can never wonder so much as you should, That the force of the stone for attraction and repelling, can be included in no bounds, can be hindered by nothing, or held back; but it will penetrate invisibly, and will move and stir those stones that are sympathizing with it, if they be put to it, and will exercise its forces, as if there were nothing between: but this must be within the compass of its vertue: for if you hang some Loadstone fitly upon a Table of wood, stone, or metal, or lying equally balanced, and you shall put your Loadstone under the Table, and stir it there, the vertue of it will pass from this body like a Spirit penetrating the solid Table, and move the stone above it, and stir it as it self is moved; as this moves, so moves that; and when this rests, that doth the same. But if the Table be made of Loadstone or Iron, the vertue is hindred, and can do nothing: we shall shew the reasons of it in their proper places. Of so many strange miracles in Nature, there is none more wonderful then this.

Chap. XVII.

How to make an Army of Sand to fight before you.

And it is as pleasant as wonderful, that I shewed to my Friends, who beheld on a plain Table an Army of Sand divided into the Right and Left Wings, fighting, to the wonder of the Spectators: and many that were ignorant of the business, thought it was done by the help of the Devil. I pounded a Loadstone into powder, some very small, some somthing gross: and I made some of little bits, that they might better represent Troops of Horse, or Companies of Foot: and so I set my Army here and there. The Wings were on the Right and Left, and the main Body was in the middle, accompanied with Troops of Horse: under a smooth Table I put a very principal Loadstone with my Hand. When this was put there, the Left Wing marched; and on the Right Hand, with another stone, the Right

Right Wing marched : when they drew neer together, and were more neer the Loadstone, the Sands trembled; and by degrees, they seemed like those that take up their Spears; and when the Loadstone was laid down, they laid down their Spears, as if they were ready to fight, and did threaten to kill and slay: and the better the Loadstone was, the higher would these hairs stretch forth themselves: and as I moved my Hands by little and little, so the Army marched on; and when the stones came neer to one the other, they seemed to fight, and run one within the other; so the other Wings and Troops came on, and shewed the form of a Battle; and you might see them sometimes retreat, sometimes march forward; sometimes to conquer, and sometimes to be conquered; sometimes to lift up their Spears, and lay them down again, as the Loadstone was put neer to them, or farther off; and the more force there was to send forth every way. But this is the greater wonder, because what is done on a plain Board, may be done hanging in the Air, that you may see them like the Antipodes in Battel: for stretching out a Paper, or setting a Table aloft, the Loadstones moved above the Table, will do the same thing we speak of, and shew it to the Spectators. But if one that is ingenious do the business, he will do more and greater Feats then we can write of.

CHAP. XVIII.

The Situation makes the Vertues of the Stone contrary.

IT cannot want wonder, as it doth reason, That the position should shew the Vertues contrary to all that we have said: for the stone put above the Table will do one thing, and another thing if it be put under the Table: for if you fit the stone by equally poising it to make it move freely, or put it into a Boat, and put a stone above it, it will attract it, or reject it, as we said before: but if you put it under the stone, it will work contrarily; for that part that drew above, will drive off beneath; and that will draw beneath, that drove off above: that is, if you place the stone above and beneath in a perpendicular. By which Experiments, one may see cleerly, That the situation will work contrary operations, and change the forces of it by turns. Wherefore in the operations of it, you must chiefly mark the position, if you put the Loastone above or beneath.

CHAP. XIX.

How the attractive force of the Loadstone may be weighed.

WE can also measure that attracting or expelling vertue of the Loadstone, or poise it in a balance: which will be of no small consequence in the following considerations; and especially, for a perpetual motion, and to make Iron hang pendulous in the Air, when the true and certain attractive Vertue is found out from the Circumference to the Centre. The Art is this: Put a piece of a Loadstone into a balance, and in the other scale as much weight of some other matter, that the scale may hang equal: then we apply a piece of Iron lying on a Table, that it may stick to the Loadstone that is in the scale: and that they may stick fast by their friendly points, you shall by degrees cast some sand into the other scale, and that so long, till the scale and iron part; so by weighing the weight of the sand, we have the Vertue of the Loadstone we sought to finde. We may also put the iron into the scale, and lay the Loadstone on the Table.

Chap. XX.

Of the mutual attraction, and driving off of the Loadstone, and of Iron.

NOw are we come to the other part of our Treaty, wherein we discourse of the mutual union of Loadstones, and of their differences one with the other: the effects whereof are so known, that they are in the mouths of all men, nor will any man almost say that he knows them not. The operation is this: Because there is such a Natural concord and sympathy between the iron and the Loadstone, as if they had made a League; that when the Loadstone comes neer the iron, the iron presently stirs, and runs to meet it, to be embraced by the Loadstone. And that embraceth it so fast, that with tossing of it up and down, you can scarce part them. And the Loadstone runs as fast to the iron, and is as much in love with that, and unity with it; for neither of them will refuse to be drawn. But the weaker still runs willingly to meet the other. That you may believe this, you shall try it thus: Either hang them both by a thread, or put them in boats, or balance them on the needle. *Pliny* speaking of this, saith, For what is more wonderful? or wherein is Nature more wanton? what is more sluggish than a cold stone? yet Nature hath given this both sense and hands. What is more powerful than hard iron? yet it yields and submits: for the Loadstone draws it; and that matter, that conquers all things, runs after I know not what; and as it comes neer, it stops, and lays fast hold, and stays constantly to be embraced. *Lucretius*, seeking the cause of this effect,

How it should be that Loadstone Iron draws:

And *Orpheus* in his Verses relates, that iron is drawn by the Loadstone, as a Bride after the Bridegroom, to be embraced; and the iron is so desirous to joyn with it as her husband, and is so sollicitous to meet the Loadstone: when it is hindred by its weight, yet it will stand an end, as if it held up its hands to beg of the stone, and flattering of it, as if it were impatient that it cannot come at it by reason of its ponderosity; and shews that it is not content with its condition: but if it once kist the Loadstone, as if the desire were satisfied, it then is at rest; and they are so mutually in love, that if one cannot come at the other, it will hang pendulous in the air. Wherefore *Albertus* very ignorantly told *Frederick* the Emperour, that a friend of his shew'd a Loadstone that did not attract iron, but was attracted by it: since the lighter of these two will stir, when the heavier approaches neer it.

Chap. XXI.

The Iron and Loadstone are in greater amity, then the Loadstone is with the Loadstone.

THe exceeding love of the Iron with the Loadstone, is greater and more effectual and far stronger, then that of the Loadstone with the Loadstone; and this is easily proved: For lay on a Table, pieces of iron, and Loadstone of the same weight; and let another Loadstone be brought neer; when it comes to a fit distance, the iron will presently stir, and runs toward the Loadstone and embraceth it. And it is proved better thus: Let a Loadstone embrace a Loadstone, and be set softly neer the iron; when the force of its circumference comes to the iron, the Loadstone will presently let fall the Loadstone, and lay hold on the iron: but let iron and that be joyned, no Loadstone can ever take them asunder to stick there.

Chap. XXII.

The Loadstone doth not draw on all parts, but at certain points.

YEt we must not think that the Loadstone draws the iron with every part, but at a set and certain point; which is to be searched out, with great reason, care, and dili-

diligence. You ſhall find it thus: either hang up the iron, or balance it on a Table, that it may preſently leap to be embraced from them: then carry your Loadſtone round about it; and when you ſee the iron tremble, and run toward the Loadſtone, touching it, that is the very point of attraction, and the beams of its vertue are ſent round about from that point: wherefore, the farther from that point the iron is, the more faintly and weakly will it move; for the more forcible vertue neſts in the Centre, as in its Throne.

CHAP. XXIII.

That the ſame Loadſtone that draws, doth on the contrary point drive off the iron.

THat no man might be deceived, thinking the Loadſtone that draws iron, to be different from that ſtone that drives it off; I tell him of it beforehand, and I ſhall by experiments diſſipate this cloud. *Pliny* ſaith, the Loadſtone that draws iron to it, is not the ſame with that which drives iron from it. And again, In the ſame Ethiopia, there is a mountain that produceth the ſtone Theamedes, that drives off iron, and rejecteth it. *Pliny* not knowing this, erred exceedingly, thinking that they were two ſtones that had theſe contrary operations; whereas it is but one and the ſame ſtone, that by ſympathy and ſimilitude, draws the willing iron to it; but with the oppoſite part, by antipathy of Natures, it drives it off. And you may be eaſily aſſured of this: for let iron be balanced equally, and let one end of the Loadſtone draw it, if you turn the other end to it, it will fly back, and turn to the contrary part: theſe points run in a right line through the middle of the ſtone. Yet obſerve this, that the iron which is drawn by one point of the Loadſtone, or is within the compaſs of its vertue for a while, obtains preſently this vertue: that what is drawn by the one end of it, will be driven off by the other. You ſhall know theſe differences of attraction more clearly by the following experiment.

CHAP. XXIV.

How iron will be made leap upon a Table, no Loadſtone being ſeen.

BY reaſon of this conſent and diſcord of the Loadſtone, I uſe to make pretty ſport to make my friends merry. For caſting the iron on the Table, and not putting any Loadſtone neer it, that the ſpectators can ſee, the iron will ſeem to move it ſelf: which is very pleaſant to behold. I do it thus: divide a needle in the middle, caſt one half of it upon the Table, but firſt rub the head of it with one end of the Loadſtone. Put your hand with the Loadſtone privately under the Table, and there where the head of the needle lyeth, the Loadſtone will ſtick, and the needle will preſently ſtand upright: and ſtanding ſo, to the wonder of the beholders, will walk over the Table, and follow the motion of the hand that guides it: when it hath gone thus a while, preſently turn the ſtone upſide down, and put the contrary part of the Loadſtone to the needle; and (which is ſtrange) the needle will turn about: and if it went on the head before, it will now go on the point; and draw your hand which way you will, the needle will follow it: and if you turn the ſtone three or four times, putting ſometimes the ſouth point, ſometimes the north point of the ſtone to it, the needle will turn as often, and ſometimes ſtand on the head, ſometimes on the point upright, or walk ſo as you pleaſe; and ſometime it will go with that part it ſtood upon, ſometimes it will ſtand on the part it went. I can preſent my friends with the ſame ſight, in a more ſtrange manner: for if you put the two pieces of a needle upon a paper or Table, whereof one hath touched the north point, the other the ſouth point of the ſtone, I can ſo place two ſtones, that one of the needles ſhall go upon the head, the other upon the point; and ſometimes one ſhall turn, then both at once, or they ſhall dance orderly, and move when any muſick is playd on. And this is a pretty ſight to ſhew your friends, that cannot but admire it.

Chap. XXV.

That the vertue of the Loadstone, is sent through the pieces of Iron.

THat vertue that is imparted to the iron, by the Loadstone, doth not stay in the iron, but is sent from one to another. For if you draw a steel needle by the touch of the Loadstone, and put another needle to the end of that needle, that part will draw the needle, and hold it hanging in the air; and if you apply another needle to that, it will do the same.

You may do this with as many needles, as the force of the Loadstone can reach unto; but when it grows faint, the needle will let the other needle fall, as not having strength enough to bear its weight. And thus you may hang a great many needles in a chain in the air. *Plato* knew this vertue, for he speaks of it in Ione: which stone, not onely draws iron rings, but infuseth vertue into the rings themselves, that they can do the same, and attract rings as the stone doth: whence sometimes you shall see a long concatenation of iron rings, and all the vertue of them is attracted from that stone. *Lucretius* knew it also.

A Stone there is that men admire much,
That makes rings hang in chains by touch.
Sometimes five or six links will be
Fast joyn'd together, and agree.
All this vertue from the Stone ariseth,
Such force it hath——

Pliny speaking of the same vertue, saith, Onely this matter receives strength from another stone, and holds it a long time; laying hold of another iron, that sometimes you shall see a chain of rings, which the ignorant vulgar call Live iron. *Galen.* You may see in the Loadstone, that when it toucheth iron, it will stick to it, without any bands: and if that was first touched, touch another, that will stick as the first doth; and likewise a third to the second. *Augustine de civitate Dei*, speaking of this wonder, said, We know that the Loadstone will wonderfully draw iron; which when I first saw, I trembled at it exceedingly. For I saw an iron ring drawn by the stone, that hung in the air by it, that communicated the same force to others: for another ring put to the first, made that hang also; and as the first ring hung by the stone, so the second ring hung by the first ring. In the same manner was there a third and fourth ring applied, and fastned; and so their rings hung together by the outsides, not fastned inwardly, like to a chain of rings. Who would not admire at the vertue of this stone? that was not onely within it, but ran through so many rings, that hung by it, and held them fast with invisible bands. But the greater the vertue of the Loadstone is, the more rings it will hang up: I have hang'd ten needles with a stone of a pound weight. But he that would draw many needles, let him rub the heads onely against the Loadstone, and they will all hold the heads by their points.

Chap. XXVI.

The Loadstone within the sphere of its vertue, sends it forth without touching.

ANd the Loadstone doth not onely impart its vertue to the iron, by touching it, but, which is wonderful, within the compass of its vertue, it will impart vertue to the iron, if it be but present, to draw another iron. For if you put your Loadstone so neer to the iron, that it may have it onely within the circumference of its vertue, and you put another iron neer to that iron, it will draw it to it; and if another touch that which is drawn, it will draw that also: that you shall see a long chain of rings or needles, hanging in the air. But when they hang thus together, if you re-

emove the Loadstone a little farther off, the last ring will fall; and if yet you remove t farther, the next will fall, until they all fall off: whence it is clear, that without touching, it can impart its vertue to the iron.

CHAP. XXVII.

How the Loadstone can hang up iron in the air.

I Have a long time endeavoured much to make iron hang in the air, and not touch the Loadstone, nor yet tied beneath: and now I think it almost impossible to be done. *Pliny* saith it: *Dinocrates* the Architect began to vault the Temple of Arsinoe with Loadstone, that therein her Image of iron might seem to hang in the air: both he and *Ptolomy* died, who commanded this to be made for his sister; so that what he began, he did not finish. The Greeks say, that in the Temple of Serapis, that is vaulted at Alexandria, there was a Load-stone set, that held a statue of brass in the air; for it had a piece of iron in the head of it. But that is false, that *Mahomets* chest hangs by the roof of the Temple. *Petrus Pellegrinus* saith, he shewed in another work how that might be done: but that work is not to be found. Why I think it extream hard, I shall say afterwards. But I say it may be done, because I have now done it, to hold it fast by an invisible band, to hang in the air; onely so, that it be bound with a small thread beneath, that it may not rise higher: and then striving to catch hold of the stone above, it will hang in the air, and tremble and wag it self.

CHAP. XXVIII.

The forces of the Loadstone cannot be hindred, by a wall or table coming between.

AS I said before of the Loadstone, the vertue of that and iron, can be hindred by no body coming between; but it will do its office. For whilst the Loadstone is moved under a Table of wood, stone, or any metal, except iron; the needle in the Mariners Compass will move above, as if there were no body between them. St. *Augustine Lib. de civitate Dei*, knew this experiment. But that is much more wonderful that I have heard: that if one hold a Loadstone under a piece of silver, and put a piece of iron above the silver, as he moves his hand underneath that holds the stone, so will the iron move above; and the silver being in the middle, and suffering nothing, running so swiftly up and down, that the stone was pull'd from the hand of the man, and took hold of the iron.

CHAP. XXIX.

How a man of wood may row a little Boat; and some other merry conceits.

THe fraud here is notable; for women shall see a man of wood rowing a little boat well waxed, in a large vessel full of water, and they can counterfeit hereby, as impostors do divination by water. The fraud is thus began: the vessel is filled with water, a little ship of Wax is put into it, or else of wood; in the middle sits a little man of wood, fastned through the middle with a hogs-bristle, so equall balanced, that with every light motion he may easily stir himself: let him have oars in his hands, and under his feet a piece of iron. Let the Alphabet be made on the brim of the vessel, round about: wherefore a woman coming to enquire of some doubtful matter, the little man of wood, as if he would give a true answer, will row to those letters that may signifie the answer: for he that holds the Loadstone in his hand, under the Table, can draw the boat which way he will, and so will answer by joyning these letters together. Or put a boy of cork into a glass viol, with a broad mouth, that turns himself about the needle equally balanced; and about the glass vessel, make the Alphabet, that the man turning round about may give answers. But I made my friends wonder exceedingly to see

A paper go up a wall, and come down of it self.

For I glew'd a piece of iron on the backside of the paper, and I gave it my friends to hold to the wall; but behinde stood a boy with a Loadstone, and the paper that was left there, stood still: my friend commanded it to go up two foot: the boy that heard what was commanded, moved the Loadstone against it, to that place: and the paper moved thither also, and so downwards, or side-ways: they that knew not the reason were astonished at it. But, which exceeds all, when he moved the Loadstone over his head, by an arch of wood, it drew the paper after it; whereupon the paper hung over our heads and moved: but all that saw it, believed the Divel was the cause of it.

Chap. XXX.

A Loadstone on a plate of iron, will not stir iron.

WE said that there is nothing coming between, can hinder the force of iron, but iron onely: so that if you lay a needle on a plate of iron, and shall bring your Loadstone to it, above or beneath, it hath no vertue to attract it, or do its office: and the reason is easie. For it stands by reason, that if iron lye upon iron, they are the same body, as a part is of the whole: and when the plate of iron, or piece, is bigger, and too heavy for the Loadstone to draw, it moves not. So that if you put the filings of iron upon a plate of iron, and with your hand underneath, you carry the Loadstone, the filings will not stir, but stand still upon the plate. Nor if iron or a Loadstone be upon a Table of iron, will they come to the stone that is put to them, but will lye as if they were asleep, and void of all vertue, or changed in their Natures. Also, if you put flat iron to a Load stone, if on the other side iron be equally balanced, it will not stir, nor move to meet it; as if all the force of the Loadstone were hindred by it. *Lucretius* saith, that it will happen so, not when iron, but brass is between them: but I rather think he writ so by hear-say, then by his sight, if we understand his meaning.

Pieces of iron I have seen,
When onely brass was put between
Them and the Loadstone, to recoil:
Brass in the middle made this broil.

Chap. XXXI.

The position of the Iron, will change the forces.

VVHat the Loadstone can do, the iron touched by the Loadstone, will do the same. I said, that the Loadstone equally balanced, by putting the south part of the Loadstone above, it will draw the north part, and the north part will drive off the north part; but on the lower part, the Nature being changed, that which drew before, drives off now; and that which drove off, draws to it. The same I judge of iron touched with the Loadstone. For iron in the Mariners Compass touched with the Loadstone, that part of the Loadstone that draws and drives off in the upper part, being put under, expels what it drew before, and draws what it expelled. I would not omit, that amongst its admirable properties, the position should cause such alteration. Whence we may conjecture, that as the stone hath a pole-arctick and antarctick; so it hath an east and west part, and its upper and nether part, as the heavens have: and therefore it is reasonable, that whereas the north and inferiour part from above, drew the south and inferiour part of the iron; now the position being changed, the upper part of the stone will draw the nether part of the iron.

CHAP. XXXII.

That the iron rubbed with the northern point of the Loadstone, will turn to the south; and with the south point to the north.

I Come to the third part, that is, to the iron touched with the Loadstone, and they are all wonderful. I say then, that when we know the north point of the stone, and we have rubbed one end of the iron with it, if it be equally balanced, or hung by a thread, or lie freely in a boat, it will turn of it self to the south. And that stands with reason: for the Loadstone imparts its force to the iron. For it is the natural force of the Loadstone, that being balanced equally, it should turn its north point to the north, and his south point to the south. But when it is rubbed on the iron, the upper part of the Loadstone is fastned to the iron; but the lower part that is neer to it, is free'd: wherefore, if you rub the iron with the north part, which fastneth to the iron, and toucheth its external superficies, it will be northern that seems to to be southern, and this south part will turn freely to the north. But contrarily, if you rub the south point against the iron, the south point is fastned to the iron, and the north point is let loose that turns to the north. Wherefore *Cardanus* speaks false, that the iron touched by the north point, will turn to the north, and that which was touched by the south point, will turn south; for we see the contrary. Yet the iron must be touched with one point, either the north or south point: for if one part bend northward, the other will tend southward; by the use whereof, so large seas are sail'd over, that being the conductor. Our Ancestors sailed, by seeing the sun by day, and the stars by night. For in the middle of the sea, as they wandred, they could no otherwise see the coasts of the world. But we cannot onely discover what coast we are in, but we can avoid the rocks under the waters; and in cloudy days and dark nights, we can at all times know the poles of the world. *Flavius* saith, an Italian found it out first, whose name was *Amalphus*, born in our Campania. But he knew not the Mariners Card, but stuck the needle in a reed, or a piece of wood, cross over; and he put the needles into a vessel full of water, that they might flote freely: then carrying about the Loadstone, the needles would follow it; which being taken away, as by a certain natural motion, the points of the needles would turn to the north pole; and having found that, stand still. Wherefore, knowing the place before they steer'd their course thither. Now the Mariners Compass is made, and a needle touched with the Loadstone, is so fitted to it, that by discovering the pole by it, all other parts of the heavens are known. There is made a rundle, with a Latin-navel upon a point of the same metal, that it may run roundly freely. Whereupon, by the touching onely of one end, the needle not alone partakes of the vertues of it, but of the other end also, whether it will or not: For if you rub the needle with the north point of the stone presently that part will turn to the south, and the opposite part to the north; and one vertue cannot be imparted without the other. So the needle touched by the south point of the stone, will turn to the north, and the other part to the south; so that the part of the needle that is touch'd, receives a contrary force, from that the stone hath.

CHAP. XXXIII.

That iron touched by the Loadstone, will impart that force to other iron.

IRon touched by the Loadstone, by that touch receiveth the vertue of the Loadstone, that it will do almost as much by attracting, and effecting, and turning it self to the pole. So the iron hanging freely, touched with the south point of the Loadstone, will turn freely to the north: if you apply the south part of the stone to the same, it will turn to the south presently. But if you touch another iron with the iron that was touched, that will turn to the south; and do but point at it with the said

ſaid point of the iron, it will turn to the north. And this force is not onely ſent into the ſecond iron, but to a third and fourth, as the force of the Loadſtone is. For if it be a ſtrong ſtone, it will ſend its vertue through eight or ten needles.

Chap. XXXIV.

The vertue received in the iron, is weakned by one that is ſtronger.

YEt this I muſt tell you, that the vertue received by the iron, is not fixt and certain, but is taken off by a ſtronger that takes it from it. As an iron touched by a weak northern point of the Loadſtone; if you rub the ſame part of the iron with a ſouth point of a ſtronger Loadſtone, it will vaniſh, and that former force of turning it ſelf to the ſouth, is taken away, and it takes a ſouthern vertue, and will turn to the north without reſiſtance. But if the Loadſtones be of equal force, they are ſo aſtoniſhed and blunted, that they will neither receive both, nor either.

Chap. XXXV.

How in a ſtone the ſouth or north point is diſcerned.

AMongſt thoſe ways I ſhewed before, I ſhall ſet down this alſo; and perchance this is the beſt, how to know the true northern and ſouthern points. Let the Loadſtone be turned round, by the wheel of the Jewellers, and poliſhed. Then make a ſlender iron, as long as the axeltre of that round ball, and lay that upon the ſtone: for it will turn it ſelf upon that line, that points juſt north and ſouth. Mark the line upon the ſtone, with ſome delible paint: do the ſame on the otherſide of the ſtone; and where it reſts upon the ball, draw the ſame line: do the ſame the third and fourth time, upon the middle of it: and where thoſe lines croſs one the other and meet, thoſe are the polar points. We may alſo find it out thus: Break a ſmall needle, and put the ſmalleſt piece upon the ſame ball, and ſtir it; for when it comes to the juſt northern point, the needle will ſtand upright, that will make ſtanders by admire, and will ſtand perpendicularly upon it: and till it do riſe thus, be not weary of moving it up and down; for when you have found it, you will be glad of it.

Chap. XXXVI.

How to rub the iron needle of the Mariners Compaſs.

IKnow that ſome are troubled how to rub the needle in the Compaſs with the Loadſtone, that it may get force to turn it ſelf to the north Pole. It muſt be done thus: When you have found the points in the ſtone, as I ſaid before; ſtrike the points lightly with a hammer, and the plates will be full of ſtiff hairs: upon which if you rub an iron needle, it will preſently get vertue to turn it ſelf to the Poles. Yet obſerve this, that if you would have your needle turn to the north, you muſt rub it on the ſouth point; but if to the ſouth, rub it with the north part: For when it is equally balanced, it will turn to theſe points in the heavens. But that it may do it more forcibly, and do its office more exactly, I ſhall lay down ſome rules fit to inſtruct you. If you ſtrike both ends of the ſtone with the hammer, that hairs may appear on both parts, that you touch the needle at both ends, for ſo the needle will ſooner do its office. Moreover, you muſt obſerve very carefully, that when the iron rub'd againſt the Loadſtone, hath received theſe hairs, that you touch it with no other iron or Loadſtone, but keep it far diſtant from them, and lock it up in a box; for by touching of others the iron will grow dull, and loſe its vertue, that it will never point out the parts of heaven perfectly. For the iron coming within the Compaſs of the vertue of another Loadſtone, will receive that, as we ſaid. So the needle muſt be proportionable to the ſtone. For from a little Loadſtone, a great

iron will not receive much vertue, nor shew the pole: also, a little piece of iron cannot receive much vertue; for it consumes by the great force of the Loadstone. Moreover, the point that shews the pole, must not be sharp, but flat a little, that it may receive those vertues of the Loadstone exactly, and hold them; for in a very sharp point, scarce any vertue will abide. Iron, the purer it is, the better will it hold the vertue. For it will hardly take upon foul and rusty iron: wherefore Mariners make it of pure steel; for steel is made of the best iron. If you observe this, iron once rubbed, will hold the vertue a hundred years; and will certainly, without failing, point exactly at the poles in the heavens, for so long time.

CHAP. XXXVII.

Of the divers uses of Mariners Compasses.

AND the needle touched, doth not onely shew the poles for the Mariners use, but almost it serves for infinite uses; as all men know that it is dayly spoken of every where. I shall speak of some of the chief. The use of the Loadstone upon the needle, is well known in Sun-dials: for when the needle stands still over the line that is made from north to south, we are so directed by it, to know the hours by the shadow falling from the Gnomon. Also, those that work in Mines use the needle, to find the veins of the metals, which way they run: for in caves under ground, in that posture the needle stands that is touched with the Loadstone, they know the veins of the metals run on that side of the heavens. Also, it doth serve very much for those that describe platforms of buildings, cities, countries, whilst the situation of the corners are taken and described upon the paper. We use it also in making passages, for to bring water under ground, in digging pits, in making Mines and Trenches, wherewith they use, with great skill, to blow up Forts, Castles, Rocks and Walls, by putting Gunpowder into them, and stopping all places of vent: the Compass guides them how to go on. Lastly, how to level the discharging of Canon, both by night and day, it is of singular vertue, and for many other uses, too tedious to relate here.

CHAP. XXXVIII.

How the Longitude of the world, may be found out by help of the Loadstone.

I Will not omit, that amongst the principal uses of the Loadstone, by the help of it the Longitude of the world may be found out. Which notable work hath employed the wits of the most knowing men. It hath been observed a long time by our men, that the needle touched with the Loadstone, will not always rest upon the Meridian line, but sometimes will decline nine degrees from it to the east; nor will it hold the same posture in all places; but in divers places, it hath divers declinations. But this errour seems to follow this order, that the neerer it is to the east, the more it will decline from the Meridian line, toward the east; and the neerer it comes to the west, the point of the needle will decline the more to the west. For finding the Meridian line, as *Ptolomy* and other Geometricians teach how, and setting up a point thereon, that the steel needle may turn freely upon the top of it, in Italy it declines toward the east nine degrees, of which there is ninety in a quadrant of a circle, as it is observed in Sun-dials that are brought out of Germany, and it is so described. Moreover, many famous travellers report, that amongst the Fortunate Islands, one is called the Azores, where the needle set in the Compass, will rest directly upon the Meridian line, without any variation at all. Also, they that sail to the west-Indies observe, that the point of the needle will decline to the west. Therefore, laying down these for true Maxims, we may easily know the longitude of the world: for if we make a very great Compass, about five foot diameter, and divide the degrees and minutes, into seconds and thirds, *&c.* and

and sailing under the Equator, we do observe the chief motions of the Needle, and the declinations of it, and shall accommodate the same to the proportion of our Voyages; we shall easily know the Longitude of the World, beginning from the Fortunate Islands. Whence both Longitude and Latitude in dark nights, and the greatest Tempests may be certainly discovered. Wherefore it is false that *Cardanus* saith, That the Needle in the Compass declines from the Meridian Line, because it inclines to the Pole Star in the little Bears Tail: whereas, the Needle declines nine Degrees, and the Polar Inclination is not so much.

Chap. XXXIX.

If the Mariners Needle stand still, and the Loadstone move, or contrarily, they will move contrary ways.

IF the Loadstone lie on the Table, and you put the North point of the Mariners Needle to the South point of the stone, and shall carry it round about by the right hand, the Needle will draw to the left: but moving the Box to the left hand, the Needle will run to the right; and it will go so far, until it stand in the middle between those two opposite points. The same will be seen in a Sun-Dial, if that stand, and the Loadstone be carried about: for if you decline to the right hand, the Needle will follow the same part; and likewise, if you turn to the left. Hence it is apparent, That the Needle in the Compass is drawn by the North-Pole: for those that sail toward the East, have it turned toward the East; and so contrarily to the West, it will move to the same point of the Heaven: and if the Loadstone be turned about, the Iron will turn about also, as a pair of Compasses about the Centre.

Chap. XL.

The Loadstone imparts a contrary force to the Needles.

NOw I will speak of the Needle touched with the Loadstone, and of the wonderful operations of it. The first is; That when the Iron is touched by the Northern point of the Loadstone, and equally balanced; if you put that part to it from which it received its force, it will not endure it, but drives it from it, and draws to it the contrary and opposite part; namely, the Southern part: the reason whereof, I set down before. The same falls out if you touch the Needle with the South part of the Loadstone: for if you presently put the same to it, it will resist it, and draw to it the North point. Hence the parts that are alike, are at enmity, and rejected as Adversaries; and the parts that are unlike do agree as Friends. Whence it is apparent, That the Loadstone imparts to the Iron a contrary force from what the end it self is, and the Steel receives the force of that point of the Loadstone which it toucheth not. And I prove it thus: Take two Needles, and put them in Boats, or hang them by Threeds; that being touched with the Loadstone, they may move freely: they are contrary one to the other, and they will joyn in the parts that were touched with contrary ends of the Loadstone, and will not endure the ends that are alike.

Chap. XLI.

Two Needles touched by the Loadstone, obtain contrary Forces.

I Will relate a strange thing, yet not far from Reason. If you touch two Needles with a Loadstone together, and set them on the same point of it; the other parts that hang on the Loadstone, will abhor and flie one from the other: and if you force them together with your hands, so soon as you let them alone, they

will presently return to their postures, and depart as far as they can from one another. The reason is this: That if two Needles stick fast to one Northern point of the Loadstone, with their points: you must imagine, that they did receive a Southern vertue; and because they are of the same similitude, they will not endure one the other; and because they are fastened to the Loadstone, they cannot get off being compelled by a greater force: but the opposite points of the Needle, because they are both alike Northerly, they must needs abhor one the other: and when they are free, one will part from the other. And when they are so hanging on, if you put to them the Southern part of another Loadstone, they will presently let go their hold, and go as far off as they can, that sometimes they are pulled off from the Loadstone, being forced by an invisible vapor.

CHAP. XLII.

That the force of the Iron that draws, will drive off Iron by diversity of Situation.

THat, as I said of the Loadstone alone, is true of the Iron that is touched with it: for if you put a Needle touched with a Loadstone by a Boat, swimming in the Water, or hanged by a Threed, or turning on a point equally balanced: if you put upon this a Needle touched with a Loadstone, it will draw it: and that part that attracted the Iron above, will put underneath, drive it away; and the part that drives off above, will draw to it, put underneath: where you may observe, that the position will work contrary operations.

CHAP. XLIII.

The Needle touched by the Loadstone on one part, doth not alwayes receive Vertue on both parts.

IF the Needle be touched at one end by the Loadstone, it receives Vertue at that end; and at the other end, the contrary vertue: But that must not be understood absolutely, but of that Needle that is of a proportionable length: for if it be too long, the vertue will not come to the other end. But would we know how far the vertue is come, we must know how far reached the Circumference of the Vertue, as I said. Therefore if the Circumference of it be a foot, the force will go a foot-long into the Needle. If we would try this: Touch a long Needle three foot long with a Loadstone at one end, if it touch the Iron at the other end, the Iron touched will not move from its place; but if you touch it a foot or two long, namely, as far as the Circumference of the Loadstones Vertue will reach, and then touch the Needle, it will presently move and be drawn by it.

CHAP. XLIV.

The Needle touched in the middle by the Loadstone, sends forth its Force at both ends.

IF the Needle be somewhat too long, and we rub it with the stone in the middle of it, the forces of the stones part are diffused to both ends of it; but very obscurely; for you shall not know which is the end: but if you touch it something farther from the middle, the neerer part will receive the forces of the part that touched it, be it the Northerly or Southerly part.

CHAP.

Chap. XLV.

An Iron Ring touched by a Loadstone, will receive both Vertues.

BUt if we rub an Iron Ring on the one side with a Loadstone, then the part that is touched, will receive the vertue of the part of the Loadstone that touched it: and the opposite part will receive the contrary: and therefore the middle of the Iron Ring will be capable but of half the force of it, as if it were straight. But if we make a Pin round as a Ring; and the part joynted together with a joynt, be rubbed with a Loadstone; and being rubbed, be stretched straight again, the ends shall receive the same vertue, be it Northern or Southern. But by degrees that force will grow feeble; and in a short time become Northerly, and the other Southerly, or will receive more vertue then it first had, may be when it was touched farther from the end. But if you would, that of these a Chain of Iron should hang in the Air, so soon as one ring touched on one side with the Loadstone, hath received force on the other side by it, we may hang a Chain of Rings in the Air, as we may of Loadstones: so then, if the Rings be laid in order upon a Table, that they may one touch the other, though they do not fasten, put the Loadstone to them, and not onely the first will be drawn, but the next, and the third, that they will hang like links of Rings: and not only will it be so, if the Loadstone touch the first, that the rest will follow; but if the stone be but neer, it will do the same without touching them.

Chap. XLVI.

An Iron Plate touched in the middle, will diffuse its forces to both ends.

WHat I said of a long Needle, I say also of an Iron Bar: for if you touch it in the middle, the Beams of it are spread like the Beams of the Sun, or light of a Candle, from the Centre to the Circumference, and extream parts. But if we touch an Iron Morter, being the force is feeble, where it is touched about the superficies, some vertue may be be perceived; but it is very weak in the extream parts.

Chap. XLVII.

How filings of Iron may receive force.

IF you wrap up filings of Iron in a paper, as Druggists do, like a Pyramis; and put a Loadstone neer it, all the filings together will receive the same force, as a long piece of Iron doth: but if you stir the filings, and put them into an open paper, that force is lost, and confounded, and can do nothing, as if it had never been touched, by reason of so many different pieces.

Chap. XLVIII.

Whether Garlick can hinder the vertues of the Loadstone.

NOw I shall pass on to other properties of the Loadstone: and first, whether the Loadstones attraction can be any ways hindred. *Plutarch* saith, That Garlick is at great enmity with the Loadstone; and such antipathy and hatred there is between these insensible Creatures, that if the Loadstone be smeered with Garlick, it will drive away Iron from it. *Ptolomy* confirms the same, That the Loadstone will not draw Iron, if it be anoynted with Garlick; as Amber will no more draw straws, and other light things to it, if they be first steeped in Oyl. It is a common Opinion amongst Sea-men, That Onyons and Garlick are at odds with the Load-

Loadstone: and Steers-men, and such as tend the Mariners Card are forbid to eat Onyons or Garlick, lest they make the Index of the Poles drunk. But when I tried all these things, I found them to be false: for not onely breathing and belching upon the Loadstone after eating of Garlick, did not stop its vertues: but when it was all anoynted over with the juice of Garlick, it did perform its office as well as if it had never been touched with it: and I could observe almost not the least difference, lest I should seem to make void the endeavors of the Ancients. And again, When I enquired of Mariners, whether it were so, that they were forbid to eat Onyons and Garlick for that reason; they said, They were old Wives fables, and things ridiculous; and that Sea-men would sooner lose their lives, then abstain from eating Onyons and Garlick.

CHAP. XLIX.

How a Loadstone astonished may be brought to it self again.

If a Loadstone be drunk, and do not its office, not as we said, by being breathed on by Garlick, but rather by reason of some other parts of the Loadstone that had touched it, so that the vertue of it is decayed and gone; we shall restore it to its former vertue, by covering it over with the filings of Iron many dayes, until, by the vapors or company of the Iron, it can perform its office as it should.

CHAP. L.

How to augment the Loadstones vertue.

There are many learned men that have attempted to augment the Loadstones vertue, and that divers wayes, that having got more forces, it might serve for very great uses. *Alexander Aphrodiseus* in the beginning of his Problems, enquires wherefore the Loadstone onely draws Iron, and is fed or helped by the filings of Iron; and the more it is fed, the better it will be: and therefore it is confirmed by Iron. But when I would try that, I took a Loadstone of a certain weight, and I buried it in a heap of Iron-filings, that I knew what they weighed; and when I had left it there many months, I found my stone to be heavier, and the Iron-filings lighter: but the difference was so small, that in one pound I could finde no sensible declination; the stone being great, and the filings many: so that I am doubtful of the truth. *Paracelsus*, being skilled in distillation, tried to do it another way: For (saith he) if any man shall quench often in Oyl of Iron, a Loadstone red hot, it will by degrees recover force, and augment so much, that it will easily pull a Nail forth that is fast in a Wall: which conceit pleased me well; and thereupon I made the stone red hot, and quenched it often in Oyl of Iron: but it was so far from getting more strength, that it lost what it had: and fearing I had not done it right, I tried it often; so I found the falsity of it, and I warn others of it also. For a Loadstone made red hot in the fire, will lose all its vertue, as I shall shew afterwards.

CHAP. LI.

That the Loadstone may lose its vertue.

I Found out, That this is the onely true way, amongst many that are set down by Writers, by heaping Fire-coals upon the Loadstone: for once made red-hot, it presently loseth all its vertue, and a vapor flies from it that is blewish black, or Brimstone-like, smelling strong, as Coals do; and when that flame and vapor ceaseth to exhale, if you take it out of the fire, all the force of it is breathed forth: and I always thought, that that was the Soul of it, and the cause of its attraction of iron; whenas iron is made of Brimstone not perfect; as I read in *Geber* and other

Writers

Writers that treat of Metals: which is the cause that it runs so swiftly to the Loadstone, and desires so much to be imbraced by it: and when that vapour is gone from the stone, it loseth all its vertue; and then it is but a dead carcass, and it is in vain to endeavour to revive it.

Chap. LII.

How the Iron touched with the Loadstone loseth its force.

THe same way the Loadstone doth, the iron loseth its force also: for though it have been excellently well touched by the Loadstone, if you heat it red-hot in the fire, it will lose its forces: and the reason is; because that part of the Loadstone that cleaves to the iron, loseth its forces in the fire; and therefore the iron deprived of that, loseth the force also. Wherefore in the Mariners Compass, or in other uses, when the iron is stupified by the touch of other things, and hath not its due forces to free it from this imperfection, we put it into the fire. Hence we finde the error of many men, who when they put the Needle into the Compass, they first make it red-hot, and then they rub it with the Loadstone, supposing it will by that means, take in the Loadstones vertue the more: but they do not onely by contraries, but they so make void the Loadstones vertues, that it cannot do its office, but that force is driven out of the iron by the fire; and it is just as it was before it was touched with the Loadstone. Wherefore, as often as that force is driven away with the fire, we may touch it again, and give it the same force.

Chap. LIII.

It is false, That the Diamond doth hinder the Loadstones vertue.

VVE shewed that it was a false report, that the Loadstone anoynted with Garlick, loseth its vertues. But it is more false, that it loseth its vertue by the presence of the Diamond. For, say some, there is so much discord between the qualities of the Loadstone and the Diamond, and they are so hateful one against the other, and secret enemies, that if the Diamond be put to the Loadstone, it presently faints and loseth all its forces. *Pliny.* The Loadstone so disagreeth with the Diamond, that if Iron be laid by it, it will not let the Loadstone draw it; and if the Loadstone do attract it, it will snatch it away again from it. St. *Augustine.* I will say what I have read of the Loadstone: How that if the Diamond be by it, it will not draw iron; and if it do, when it comes neer the Diamond, it will let it fall. *Marbodeus* of the Loadstone:

All Loadstones by their vertue Iron draw;
But of the Diamond it stands in awe:
Taking the Iron from't by Natures Law.

I tried this often, and found it false; and that there is no Truth in it. But there are many Smatterers and ignorant Fellows, that would fain reconcile the ancient Writers, and excuse these lyes; not seeing what damage they bring to the Commonwealth of Learning. For the new Writers, building on their ground, thinking them true, add to them, and invent, and draw other Experiments from them, that are falser then the Principles they insisted on. *The blinde leads the blinde, and both fall into the pit.* Truth must be searched, loved and professed by all men; nor must any mens authority, old or new, hold us from it. But to return from whence those Reconcilers idleness drew me: I took a piece of a Loadstone to try by; it was hardly four Grains in weight: I fastned the filings of iron very fast to it; then I put the Diamond that was three or four times bigger then them both; but that would not make the Loadstone forsake the iron: then I took off the filings of iron from the Loadstone,

and

and set them at a just distance, and it drew the filings to it, though the Diamond were by. I say this, lest they should think I failed in the trial, and to have taken a Loadstone of twenty or thirty pound weight, and fastened an ounce of iron to it, and then to have taken a very small Diamond, and put it to them to make trial with.

CHAP. LIV.

Goats blood doth not free the Loadstone from the inchantment of the Diamond.

I Said, That from false Principles, are drawn most false Conclusions. Also I said, That it is related that the juice of Garlick smeered on the Loadstone, will take away its attraction of iron; and, That when the Diamond is by, it will not draw iron, or will let it fall. But because (say some) Goats blood will break the Diamond, if the Loadstone be anoynted with Goats blood, it will recover. *Castianus in Geoponic. Græc.* The Loadstone draws iron to it, and again drives it away from it, if it be annointed with Garlick: but that the force almost lost may be restored, it must be washed in Goats blood. *Rhennius* the Interpreter of *Dionysius*.

'Gainst which, nor fire, nor steel ever won;
Goats blood if warm, can break the Diamond:
Nor strokes o' th' Hammer can consume this Stone,
Which from the Loadstone doth the Iron take,
That it would still embrace it, let alone:
Diamonds, Loadstones vertues empty make.

Marbodeus of the same.

A Diamond is mighty hard: a Stone
That on the Anvil never can be broke;
Nor steel, nor fire hurt it, yet 'tis known,
It crumbles in Goats blood, if laid to soak.

Since therefore there is an Antipathy between the Diamond and the Loadstone; and there is as great Antipathy between the Diamond and Goats blood, as there is sympathy between Goats blood and the Loadstone; We are from this Argument proceeded thus far, that when the vertue of the Loadstone is grown dull, either by the presence of the Diamond, or stink of Garlick, if it be washed in Goats blood it will then recover its former force, and be made more strong: but I have tried that all the reports are false. For the Diamond is not so hard as men say it is: for it will yield to steel, and to a moderate fire: nor doth it grow soft in Goats blood, or Camels blood, or Asses blood: and our Jewellers count all these Relations false and ridiculous. Nor is the vertue of the Loadstone, being lost, recovered by Goats blood. I have said so much, to let men see what false Conclusions are drawn from false Principles.

CHAP. LV.

The Iron touched with a Diamond will turn to the North.

BUt this is most true, that I found out by chance when I made trial, whether the Diamond had any forces to weaken the Loadstones vertue, as I said: for if you rub a steel-Needle on a Diamond, and then put it into a Boat, or thrust it through a reed, or hang it up by a Threed, it will presently turn to the North, almost as well as if it had been touched with the Loadstone; but something more faintly. And, what is worth noting, the contrary part will turn the iron to the South;

South: and when I had tried this in many ſteel-Needles, and put them all into the Water, I found, that they all ſtood equi-diſtant, pointing to the North. And if they that write, That the Loadſtone is weakned by the preſence of the Diamond, had written thus, they had ſaid more Truth: for a Needle rubbed on a Diamond, and ſtuck in a ſtraw, and put into the water, that it may turn freely; being turned with your finger, when it ſtands ſtill, it will turn North, and point at it exactly.

Chap. LVI.

The forces and remedies of the Loadſtone.

OUr Anceſtors invented many things, by reaſon of this admirable attractive operation of the Loadſtone, and found out many remedies that are worth obſerving. From this drawing quality that it allures iron to it, and that they mutually attract the one the other; they did attribute unto it an underſtanding of venerious actions, and that they are one in love with the other; nor will their mad love abate, till they imbrace each one the other: and when they turn their backs, they hate one the other, and drive one the other off; and that they contain in them alſo the Principles of hatred. *Marbodeus.*

This Stone doth reconcile the man and wife,
And her recal that from her husband goes:
If one would know her leads a whoriſh life,
Under her head, when that ſhe ſleeps, it ſhows:
For ſhe that's chaſt, will preſently imbrace
Her husband whilſt ſhe ſleepeth; but a whore
Falls out o' th' bed, as thrown out with diſgrace,
With ſtink o' th' Stone, which ſhows this, and much more.

And for this cauſe, our Anceſtors to ſignifie as much, did oft-times engrave the picture of *Venus* upon the Loadſtone. Hence *Claudian* writes,

The Loadſtone Venus oft-times repreſents.

I remember alſo, that many of the Ancients reported, That if a Loadſtone were beat into powder, and were ſtrewed into burning Coles, about the corners of the houſe, that the ſmoke might flie up; thoſe that are in the houſe, will preſently run out for fear the houſe will fall; and frighted with theſe phantaſmes, would run, forſaking all their houſes: and thus Thieves may ſteal all their Goods. *Marbodeus.*

If that a Thief can creep into a Houſe
That's full of wealth, and Treaſure hath good ſtore;
Let him on burning Coles, before he rowſe
The people, ſtrew the Loadſtone duſt all ore,
That ſo the Smoke may at each corner riſe,
And that will make the people wake, and think
The houſe will fall, and run out with great cries,
Then may he take away their Gold and chink.

The reaſon is, Becauſe the Loadſtone is melancholick, as you may conjecture by the colour of it; the fumes whereof, riſing into the brain, will cauſe thoſe that are a ſleep to have melancholick phantaſms preſented unto them: and Coles will do the like. The weight Davic, with Serpents fat, and juice of Metals, given to one to drink, will make him mad, and make him run out of his Houſe, Country and Nation: and this

this it doth by exaggeration of black Melancholy: or it will make people lunatick and melancholick if they do but hold it in their mouths: and by its drawing out of iron, Physitians think it will help well to draw an Arrow-head out of ones body.

But we use the Loadstone in making Glass. *Pliny.* After Glass was found out, as it is a very cunning invention, men were not content to mingle Nitre; but they began to add the Loadstone thereunto, because it is supposed, that it will attract the liquor of the Glass into it self, and into iron also. Hence it is, that in making Glass, we add a little piece of Loadstone to it, for that singular vertue is confirmed by our times, as well as former times: it is thought so to attract into it self the liquor of the Glass, as it draws iron to it; and being attracted, it purgeth it; and from green or yellowish Glass, it makes it white: but the fire afterwards consumes the Loadstone. Out of *Agricola.* We read also, That a Loadstone laid to ones head, will take away all the pains. *Galen* saith, It hath purging faculties; and therefore it is given to drink for the Dropsie: and it will draw forth all the water in the Belly. Lastly, I shall not pass by the error of *Hadrian*, concerning the Loadstone: for he saith, That the iron by its weight makes the Loadstone never the heavier. For the Naturalists report, That if a great Loadstone were weighed in a Scale, and after that, should draw iron to it, it would be no heavier then it was when it was alone, though they be both together; so the weight of the iron is as it were consumed by the Loadstone, and hindred by it from any effect or motion: which I finde to be false. It is like that jear in *Aristophanes*, of a Clown that rid upon an Ass, and carried his Coulter at his back, that he might not load the Ass too much.

THE

THE EIGHTH BOOK OF Natural Magick:

Of Physical Experiments.

The Proeme.

I Intended to pass by these following Experiments in Physick, because I have everywhere mentioned them in my History of Plants; and we have not omitted any thing, that was certain and secret in them that we knew, unless it be such things as could not be brought into that rank. And though other things shall be described in my Book of Distillations, yet that this place of Physick be not left empty, I changed my opinion, and have set down some of them here.

Chap. I.

Of Medicines which cause sleep.

THat we may in order set down those Experiments, of which we intend to speak, we will begin with those Diseases which happen in the Head; and first, with Sleep: for Soporiferous Receits are very requisite to be placed amongst these Arcana, and are of very great esteem amongst Physitians, who by Sleep are wont to cheat their Patients of pain: and not of less, amongst Captains and Generals, when they practice Stratagemes upon their Enemies. Soporiferous Medicines do consist for the most part of cold and moist things. *Plutarch* in *Simpos.* saith, That Sleep is caused by cold; and therefore Dormitives have a cooling quality. We will teach, first, how

To cause Sleep with Mandrake.

Dioscorides saith, That men will presently fall asleep in the very same posture wherein they drink Mandrake, losing all their senses for three or four hours after; and that Physitians do use it, when they would burn or cut off a member. And skilful men affirm, That Mandrake growing by a Vine, will transmit its Soporiferous quality into it; so that those who drink the Wine that is made thereof, shall more easily and readily fall asleep. Here we will relate the pleasant stories of the Mandrake out of Authors of Stratagems. *Junius Frontinus* reports, That *Hannibal* being sent by the Charthagenians, against some Rebels in Africa; and knowing they were a Nation greedy of Wine, mixed a great quantity of Mandrake with his Wines; the quality of which, is between poysonous and sleepy: then beginning a light Skirmish, he retired on purpose; and in the middle of the Night, counterfeited a flight, leaving some Baggage in his Camp, and all the infected Wine. Now when those Barbarians had took his Camp, and for joy, had liberally tasted of that treacherous Wine; he returned, took and slew them all, as they lay dead as it were before. *Polinaus* the same. And *Cæsar* sailing towards Nicomedia, was taken about Malea by some Cilician Pirates: and when they demanded a great Ransome for his Liberty, he promised them double what they asked. They arrived at Miletum: the people

 came

came out of the Town to see them. *Cæsar* sent his Servant, being a Milesian, named *Epicrates*, to those of the Town; desiring them to lend him some money; which they presently sent to him: *Epicrates*, according to *Cæsar*'s command, brought the money; and with it, a sumptuous Banquet, a Water-pot full of Swords, and Wine mixed with Mandrake. *Cæsar* paid to the Pirates the promised sum, and set the Banquet before them; who, being exalted with their great Riches, fell freely to it; and drinking the infected Wine, fell into a sleep: *Cæsar* commanded them to be killed sleeping, and presently repaid the Milesians their own money. *Demosthenes*, intending to express those who are bitten as it were by a sleepy Dragon, and are slothful, and so deprived of sense that they cannot be awakened; saith: They seem like men who have drunk Mandrake. *Pliny* affirmeth, That smelling to the Leaves of it, provoketh sleep.

For the same, with Nightshade.

We may make the same of Nightshade, which is also called, Hypnoticon, from the effect of it: a Drachm of the Rinde, drank in Wine, causeth sleep, but gently and kindely. This later Age, seemeth to have lost the knowledge of Solanum Manicon: for in the very description of it, *Dioscorides* seems to be mad. But in my judgement, (as I have elsewhere said) he describes two several Plants in that place: *Fuschius* his Stramonium, and the Herb commonly called Bella Donna, whose qualities are wonderfully dormitive: for they infect Water, without giving it either taste or sent; so that the deceit cannot be discovered, especially, considering it must be given but in a very small quantity. I prepared a Water of it, and gave it to a Friend for certain uses; who, instead of a Drachm, drank an Ounce; and thereupon lay four days without meat or motion; so that he was thought dead by all; neither could he be awakened by any means, till at last, when the vapours were digested, he arose: although *Dioscorides* threatneth nothing but death from the immoderate use of it. The same may be made also

Of Poppy

In a Lohoch. Take the Heads of Poppy, and cut them cross-ways, with a tender hand, lest the knife enter too deep: let your nail direct the issuing juice into a Glass; where let it stand a while, and it will congeal. The Thebane Poppy is best. You may do the same with Nightshade, Henbane. Of all these together, you may make

A Sleeping Apple.

For it is made of Opium, Mandrake, juice of Hemlock, the Seeds of Henbane; and adding a little Musk, to gain an easier reception of the Smeller: these being made up into a ball, as big as a mans hand can hold, and often smelt to, gently close the eyes, and binde them with a deep sleep. Now shall be shown

A wonderful way to make one take a sleeping Medicine in his sleep.

Those things which we have already spoken of, are easily discovered after sleep, and bring a suspicion along with them. But out of many of the aforenamed dormitive menstrues, there may be extracted a Quintessence, which must be kept in Leaden Vessels, very closely stop'd, that it may not have the least vent, lest it should flie out. When you would use it, uncover it, and hold it to a sleeping man's Nostrils, whose breath will suck up this subtile essence, which will so besiege the Castle of his senses, that he will be overwhelmed with a most profound sleep, not to be shook off without much labour. After sleep, no heaviness will remain in his Head, nor any suspicion of Art. These things are manifest to a wise Physitian; to a wicked One, obscure.

CHAP. II.

To make a Man out of his senses for a day.

AFter these Medicines to cause sleep, we will speak of those which make men mad: the business is almost the same: for the same Plants that induce sleep, if they be taken in a larger proportion, do cause madness. But we will not tell those things which breed it for ever, onely which may make us sport for a day, and afterwards leave no harm. We will begin with,

How to make men mad with Mandrake.

We have told you, That a small dose brings sleep; a little more, madness; a larger, death. *Dioscorides* saith, That a Drachm of Motion will make one foolish: we will easilier do it with Wine, which is thus made: Take the Roots of Mandrake, and but put them into new Wine, boyling and bubling up: cover it close; and let them infuse in a warm place for two months. When you would use it, give it to somebody to drink; and whosoever shall taste it after a deep sleep, will be distracted, and for a day shall rave: but after some sleep, will return to his senses again, without any harm: and it is very pleasant to behold. Pray make trial. We may do the same

With Stramonium, or Solanum Manicum:

The Seeds of which, being dried and macerated in Wine, the space of a night, and a Drachm of it drank in a Glass of Wine, (but rightly given, lest it hurt the man) after a few hours will make one mad, and present strange visions, both pleasant and horrible; and of all other sorts: as the power of the potion, so doth the madness also cease, after some sleep, without any harm, as we said, if it were rightly administred. We may also infect any kinde of meat with it, by strowing thereon: three fingers full of the Root reduced into powder, it causeth a pleasant kinde of madness for a day; but the poysonous quality is allayed by sleep, or by washing the Temples and Pulses with Vinegar, or juice of Lemmon. We may also do the same with another kinde of Solanum, called

Bella Donna.

A Drachm of the Root of which, amongst other properties, hath this; that it will make men mad without any hurt: so that it is a most pleasant spectacle to behold such mad whimsies and visions; which also is cured by sleep: but sometimes they refuse to eat. Nevertheless, we give this præcaution, That all those Roots or Seeds which cause the Takers of them to see delightful visions, if their Dose be increased, will continue this alienation of minde for three days: but if it be quadrupled, it brings death. Wherefore we must proceed cautiously with them. I had a Friend, who, as oft as he pleased, knew how

To make a man believe he was changed

into a Bird or Beast; and cause madness at his pleasure. For by drinking a certain Potion, the man would seem sometimes to be changed into a Fish; and flinging out his arms, would swim on the Ground: sometimes he would seem to skip up, and then to dive down again. Another would believe himself turned into a Goose, and would eat Grass, and beat the Ground with his Teeth, like a Goose: now and then sing, and endeavour to clap his Wings. And this he did with the aforenamed Plants: neither did he exclude Henbane from among his Ingredients; extracting the essences by their Menstruum, and mix'd some of their Brain, Heart, Limbs, and other parts with them. I remember when I was a young man, I tried these things on my Chamber-Fellows: and their madness still fixed upon something they had eaten, and their fancy worked according to the quality of their meat. One, who had fed lustily upon Beef, saw nothing but the formes of Bulls in his imagination,

and them running at him with their horns; and such-like things. Another man also by drinking a Potion, flung himself upon the earth, and like one ready to be drowned, struck forth his legs and arms, endeavouring as it were to swim for life: but when the strength of the Medicament began to decay, like a Shipwrack'd person, who had escaped out of the Sea, he wrung his Hair and his Clothes to strain the Water out of them; and drew his breath, as though he took such pains to escape the danger. These, and many other most pleasant things, the curious Enquirer may finde out: it is enough for me only to have hinted at the manner of doing them.

CHAP. III.

To cause several kindes of dreams.

NOw we will endeavour to shew how to cause pleasant, sad, or true dreams. But that we may more certainly effect it, it will be good first to know the causes. The meat in concoction must be corrupted, (this must be taken for granted) and turned into vapors; which, being hot and light, will naturally ascend, and creep through the Veins into the Brain; which being always cold, condenseth them into moisture, as we see Clouds generated in the greater World: so by an inward reciprocation, they fall down again upon the Heart, the principal seat of the senses. In the mean while, the Head grows full and heavy, and is overwhelmed in a deep sleep. Whence it comes to pass, that the species descending, meet and mix with other vapors, which make them appear preposterous and monstrous; especially, in the quiet of the night. But in the morning, when the excrementitious and foul Blood is separated from the pure and good, and become cool and allayed; then pure, and unmixed, and pleasant visions appear. Wherefore I thought it not irrational, when a man is overwhelmed with drink, that vapors should arise participating, as well of the Nature of what he hath drank or eat, as of the humours which abound in his body, that in his sleep he should rejoyce or be much troubled: that fires and darkness, hail and putrefactions, should proceed from Choler, Melancholy, cold and putrid humors. So to dream of killing any one, or being besmeared with Blood, shews an abundance of Blood: and *Hippocrates* and *Galen* say, We may judge a man to be of a sanguine Complexion by it. Hence those who eat windy meats, by reason thereof, have rough and monstrous dreams: meats of thin and small vapours, exhilarate the minde with pleasant phantasms. So also the outward application of simples, doth infect the species while they are a going to the Heart. For the Arteries of the body, saith *Galen*, while they are dilated, do attract into themselves any thing that is next them. It will much help too, to anoynt the Liver: for the Blood passeth upward out of the Stomack by evaporation, and runneth to the Liver; from the Liver to the Heart. Thus the circulating vapors are infected, and represent species of the same colour. That we may not please the Sleepers onely, but also the Waking, behold

A way to cause merry dreams.

When you go to bed, to eat Balm, and you cannot desire more pleasant sights then will appear to you; Fields, Gardens, Trees, Flowers, Meadows, and all the Ground of a pleasant Green, and covered with shady Bowers: wheresoever you cast your eyes, the whole World will appear pleasant and Green. Buglos will do the same, and Bows of Poplar; so also Oyl of Poplar. But

To make dark and troublesome dreams,

we eat Beans; and therefore they are abhorred by the Pythagoreans, because they cause such dreams. Phaseoli, or French Beans, cause the same: Lentiles, Onyons, Garlick, Leeks, VVeedbine, Dorycnium, Picnocomum, new red VVine; these infuse dreames, wherein the phantasms are broken, crooked, angry, troubled: the person dreaming will seem to be carried in the Air, and to see the Rivers and Sea under him: he shall dream of misfortunes, falling, death, cruel tempests,

showers

showers of Rain, and cloudy dayes; the Sun darkned, and the Heavens frowning, and nothing but fearful apparitions. So by anointing the aforesaid places with Soot, or any adust matter, and Oyl, (which I add onely to make the other enter the easier into the parts) fires, lightnings, flashings, and all things will appear in darkness. These are sufficient: for I have already shewed in my Book *Phytognom.* how to procure true dreams.

Chap. IV.

Excellent Remedies for the Eyes.

Heretofore, being much troubled with sore Eyes, and become almost blinde; when I was given over by Physitians of best account, a certain Empyrick undertook me; who, putting this VVater into my Eye, cured me the very same day: I might almost say, The same hour. By Gifts, Entreaties, Cunning and Money, I gained the Secret, which I will not think much to set down, that every one may use it at their pleasure. It is good for Inflammations, Blearness, Mists, Fistula's, and such-like; and cureth them certainly the second day; if not the first. If I should set down all those whom I have cured by it, I should be too tedious. Take two Bottles of Greek-VVine, half a Pint of White-Rose-water; of Celendine, two Ounces; of Fennel, Rue, Eye-bright, as much; of Tutty, half an Ounce; of Cloves as much; Sugar-Candy of Roses, one Drachm; Camphire, half a Drachm; and as much Aloes. Tutty is prepared after this manner: Let it be heat and extinguished six times in Rose-water, mixed with Greek-Wine; but let the water at last be left out: powder what are to be powdered finely; and mix them with the waters. Aloes is incorporated with waters thus: because it will not be powered, let it be put into a Mortar with a little of the forementioned waters, and beat together until it turn to water, and swim about in ropings, and mix with the waters: then put it to the rest. Set them all in a Glass-Bottle, close covered, and waxed up that it do not exhale abroad in the Sun and Dew for forty dayes, still shaking them four times in a day: at last, when it is well sunned, set it up and reserve it for your use. It must be applied thus

In Inflammations, Blood-shots and Fistula's;

let the Patient lie flat on his back; and when a drop of this water is put upon his Eye, let him open and shut his Eye-lids, that the water may run through all the cavities of his Eye. Do this twice or thrice in a day, and he shall be cured. But thus it must be used for

A Pearl in the Eye.

If the Pearl be above or beneath the Cornea, make a Powder of Sugar-Candy of Roses, burnt Allome, and the Bone of a Cuttle-Fish, very finely beat and searched exactly; and when the Patient goeth to Bed, sprinkle a little of this Powder upon his eye, and by and by drop some of this water into it, and let him shut his Eyes and sleep: for he will quickly be cured.

Chap. V.

To fasten the Teeth.

I Could finde not any thing in all this Physical Tract of greater value then this Remedy for the Teeth: for the water gets in through the Gumms, even to the very Nerves of the Teeth, and strengthens and fasteneth them: yea, if they are eaten away, it filleth them with Flesh, and new cloaths them. Moreover, it maketh them clean, and white, and shining like Pearls. I know a man, who by this onely Receit, gained great Riches. Take therefore three handfuls of Sage,

Nettles,

Nettles, Rosemary, Mallows, and the rinde of the Roots of Wall-nut: wash them well, and beat them: also, as much of the Flowers of Sage, Rosemary, Olive and Plantaine Leaves; two handfuls of Hypocistis, Horehound, and the tops of Bramble; one pound of the Flower of Mirtle; half a pound of the Seed; two handfuls of Rose-Buds, with their Stalks; two drachms of Saunders, Coriander prepared, and Citron-Pill: three drachms of Cinnamon in powder; ten of Cypress Nuts; five green Pine Apples; two drachms of Bole-Armenick and Mastick. Powder them all, and infuse them in sharp black Wine, and let them macerate three dayes: then, slightly pressing the Wine out, put them into an Alembick, and still them with a gentle fire: then boyl the distilled water, with two ounces of Allome till it be dissolved, in a Vessel close stopt. When you would use it, suck up some of the water, and stir it up and down your mouth until it turn to Froth: then spit it out, and rub your Teeth with a Linen-cloth. It will perform what I have promised: for it fasteneth the Teeth, and restoreth the Gums that are eroded. Now we will deliver other Experiments

To fasten the Teeth.

Macerate the Leaves of Mastick, Rosemary, Sage, and Bramble; in Greek-Wine: then distil it with a gentle fire through a Retort: take a mouthful of this, and stir about, till it turn to Spittle; it fasteneth the Teeth, maketh them white, and restoreth the Gums. The Root of Pelitory bruised, and put into the Teeth, takes away the pain: so doth the Root of Henbane. For the bleeding of the Teeth, I have often made trial of Purslaine, so much commended.

For the swelling of the Gums,

beat the Roots and Leaves of Plantaine, and lay them to the swelling when you go to bed; and in the morning you shall finde your Gums well.

CHAP. VI.

For other infirmities of Mans Body.

I Will heap together in this Chapter, some Remedies not to be passed over, which I know to be certain, by continual Experience made; and although some of them are common, yet are they true. And first,

For the Head-ach,

There is a certain Essence, of the colour of Blood, extracted out of Roses, of a wonderful sweetness and great strength. Wet a cloth in this Liquor, and lay it to your Fore-head and Temples; and if sometimes it doth not quite take away a pain of long continuance, yet it will mollifie it. If the cloth be dried before your pain cease, wet it again. I have often known the Ophites, or Serpentine Marble applied to the Head, both to take away, and mollifie the pain. The Vertigo, I have seen it cured also, by applying the Hoof of an Elk, and by a Ring of it worn on the Finger.

Against the chopping of the Lips

the Seeds of Henbane are good: for being cast upon live Coles, if you receive the rising vapor through a Paper-Tunnel, upon the chopping of your Lips, as hot as you can endure, it appeaseth the swelling presently, and healeth the Clefts, that they will never more trouble you.

Against the clefts of the Fingers.

It is a most admirable Experiment, which I learned of *Paracelsus*; but have often practiced it my self: for it taketh away the swelling and pain, and cureth the Nail. Take a Worm, which creepeth out of the Earth; especially, in moyst

Grounds:

Grounds: for if you search and dig there, you may easily finde them; winde him, being alive, about your Finger, and there hold him till he be dead, which will be within an hour. The pain will presently cease, the matter dry away, and in a short time be cured: Indeed I do not know a more admirable Remedy.

For a Pleurisie.

I found out a most powerful Remedy made of the Flowers of wilde Poppy. Gather them in the Month of *May*, before the rising of the Sun, and their opening: for, being thin Leaves, they are easily dried with a little heat, and shed: dry them in the shade, and lay them up for your use. Or else, still the Flowers, and keep the water. If any one taketh a drachm of the powder in Wine, and some of the water; or in the water alone: or shall apply a Plaister of the Powder to the place, the pain will presently cease, to the admiration of the Beholders. Missleto of the Oak infused in Wine, and drunk, doth the same. There is a Stone also brought out of the West-Indies, called in Spanish, Della Hijada; much like an Emerald: which being worn in Silver, upon the Arm, is accounted a preservative against this Disease.

Against the Colick.

Civet is most excellent in this Disease: for the quantity of a Pease, applied to the Navil, and a hot Loaf out of the Oven clapt over it, presently easeth the pain: the Patient must ly on his Belly upon the Bread before it be cold.

Against Crab lice.

The Dust which falls from the Curry-Combs, while the Ostler dresseth Horses, or such kinde of Beasts, cureth them without any pain. Or the Powder of Lithargy, Aloes, Frankincense, Verdegreese, and Alome, beaten and mixed together with Oyl of Mastick, and anoynt the place. The Powder of Mercury præcipitate, is best by far, being applied.

To bring away the Stone,

Take Saxifrage, Maiden-hair, Pellitory of the wall, Parsely, Pimpernel and Ceterach; distil them in Balneo Mariæ, and let the Patient drink of it every other day: for it corrodes and eats away the Stone, though never so great; and by daily experience, you will see in his Urine, Gravel and Fragments of the Stone voided out. Moreover, the Fruit and Leaves of the Mulberry gathered before Sun-rising, and distilled or dried in the shade, if it be drank in Wine, or a proper water, early in the morning, doth wonderfully remove the Stone. Mushromes growing on a Rock, reduced into Powder, or dried in the shade, or a warm Oven, and drank with Wine in a morning, is very Soveraign against the Stone. If the Kernels of a Peach-Stone be bruised, and macerated two dayes in the distilled water of Bean-Cods, and then distilled again, and drunk, bring down the Stone. The Hedge-Sparrow, which *Aëtius* mentioneth, I know to be good against the Stone in the Kidney or Bladder. It is the least of all Birds, liveth in Hedges, carrieth his Tail upright; on the top of his Wings, there are some streaks of Ash-colour; of a short flight: and lastly, much like a Wren. He hath a vertue against the Stone beyond all the rest, eaten either raw or boyled, or dried or salted, or taken any way; also reduced into Powder, being made up close in a Pot covered and clayed up, that the vertue may not expire; and so set over the fire. I have also tried a water against this Disease, running out of a certain Vein, described by *Vitruvius*: which when I had diligently sought after, and found out, made me exceedingly rejoyce. The words of *Vitruvius* are these: There are also some Veins of acide Springs, as at Lyncestum; and in Italy, at Theano in fertile Campania; and many other places: which being drunk, have a vertue to dissolve Stones which breed in the Bladders of men. And this seems to be naturally done, because there lieth a sharp and acide juice under the Earth, through which, these Veins passing, receive a tincture of sharpness; and so, when they come into the Bodies of Men, they dissolve whatever they finde there con-

congealed or setled. But wherefore acide things should dissolve them, we may thus guess the Reason: An Egg laid in any Vinegar some time, will wax soft, and his shell will dissolve. Also Lead, which is the toughest and heaviest, if it be laid in a Vessel of Vinegar, and closed up, will dissolve, and become Cerus. By the same means, Copper, which is of a more solid Nature, if it be ordered as the former, will melt, and become Verdegreese. Likewise Pearl, as hard as Flint, which neither iron or fire can dissolve of themselves, when they are heat by the fire, and then sprinkled with Vinegar, break and dissolve. Therefore, when we see these things done before our eyes, we may infer by the same Reasons, that the Stone may naturally be dissolved by acide things, through the sharpness of their juice. Thus far *Vitruvius*. The place where the Vein is now to be found, is called commonly Francolise, about a mile from Theano, and runneth along the way towards Rome.

To strengthen the Stomach.

We will not omit a wonderful Oyl, which helpeth concoction, and taketh away the inclinations to vomit: it is thus made: Pour half a Pint of the best Oyl into a brass Pot, tinned within, and of a wide mouth: then take fifteen pound of Romane-Mint, and beat it in a Marble-Morter, with a VVooden-Pestle, until it come to the form of an Oynment; add as much more Mint and VVormwood, and put them into the Oyl: mingle them, and stir them well: but cover the Pot lest any durt should fall in; and let them stand three dayes, and infuse: then set them on a gentle fire, and boyl them five hours for fifteen dayes together, until the Oyl have extracted all the vertue of the infused Herbs: then strain them through a Linen-cloth in a press, or with your hands, till the Oyl be run cleer out: then take new Herbs, beat them, and put them into the strained Oyl; boyl it again, and strain it again: do the same the third time; and as often as you renew it, observe the same course, until the Oyl have contracted a green colour: but you must separate the juice from the Oyl very carefully; for if the least drop do remain in it, the Oyl will have but small operation, and the whole intent is lost. A certain sign of perfect decoction, and of the juice being consumed, will be, if a drop of it, being cast upon a plate of iron red-hot, do not hiss. At last, Take a pound of Cinnamon, half a pound of Nutmegs, as much Mastick and Spikenard, and a third part of Cloves: poun them severally; and being well seirced, put them into the Oyl, and mix them with a VVooden-stick. Then pour it all into an Earthen Vessel glazed within, with a long Neck, that it may easily be shut, and stopt close; but let it be of so great a capacity, that the third part of it may remain empty. Let it stand fifteen days in the Sun, alwayes moving, and shaking it three or four times in a day. So set it up for your use.

CHAP. VII.

That a Woman may conceive.

THere are many Medicines to cause Conception spread abroad, because they are much desired by Great Persons. The Ancients did applaud Sage very much for this purpose: And in Coptus after great Plagues, the Egyptians that survived, forced the Women to drink the juice of it, to make them conceive, and bring forth often. Salt also helpeth Generation: for it doth not only heighten the Pleasures of *Venus*, but also causeth Fruitfulness. The Egyptians, when their Dogs are backward in Copulation, make them more eager by giving them Salt-meats. It is an Argument also of it, That Ships in the Sea, as *Plutarch* witnesseth, are alwayes full of an innumerable company of Mice. And some affirm, That Female-Mice will conceive without a Male, onely by licking Salt. And Fish-wives are insatiably leacherous, and alwayes full of Children. Hence the Poets feigned *Venus* to be born of Salt or the Sea. The Egyptian Priests (saith the same Author) did most Religiously abstain from Salt and Salt-meats, because they did excite to lust, and cause erection.

A remedy to procure conception.

This I have tryed and found the best; when a womans courses are just past, let her take a new-laid egge, boil it, and mix a grain of musk with it, and sup it up when she goes to bed. Next morning take some old beans, at least five years old, and boil them for a good space in a new pipkin, and let the woman when she ariseth out of her bed, receive the fume into her privities, as it were through a tunnel, for the space of an hour: then let her sup up two eggs, and go to bed again, and wipe off the moisture with warm clothes: then let her enjoy her husband, and rest a while; afterwards, take the whites of two eggs, and mix them with Bole-armenick and Sanguis-draconis, and dip some flax into it, and apply it to the reins; but because it will hardly stick on, swathe it on from falling: a while after, let her arise, and at night renew the plaister. But when she goeth to sleep, let her hold ginger in her mouth. This she must do nine days.

Chap. VIII.
Remedies against the Pox.

Since this disease hath raged so cruelly amongst men, there have been invented a multitude of most excellent remedies to oppose it. And although many have set out several of them, yet I will be contented with this one only, which we may use, not onely in this disease, but almost in all other: and I have seen many experiences of it. It is easily made, and as easily taken. Take a pound of lingnum Guaiacum, half a pound of Sarsaperilla beaten small, five ounces of the stalks and leaves of Sena, one handful of Agrimony and Horse-tail, a drachm of Cinnamon, and as much cloves, and one nutmeg: Pound them all, and put them into a vessel which containeth twenty gallons of Greek wine; let it stand a day, and then let the patient drink it at meals, and at his pleasure: for it purgeth away by degrees all maladies, beside the French-pox. If the patient groweth weak with purging, let him intermit some days. In the summer time leave out the cinnamon, and the nutmeg. I have used it against continual head-aches, deafness, hoarsness, and many other diseases.

A preservation against the Pox,

which a man may use after unclean women. Take a drachm of hartwort and gentian, two scruples of sanders and lignum-aloes, half a drachm of powder of coral, spodium, and harts horn burnt, a handful of sowthistle, scordium, betony, scabious, and tormentil; as much of roses, two pieces of Guaiacum, two scales of copper, a drachm and a half of Mercury precipitate; a pint of malmesey, a quart of the waters of sowthistle, and scabious: mix the wine and waters, and lay the Guaiacum in it a day, and then the rest; then boil them, till half be consumed; strain them, and lay a linnencloth soaking in the expression a whole night; then dry it in the shade: do this thrice, and after copulation, wash your yard in it, and lay some of the linnen on, and keep it close.

Chap. IX.
Antidotes against Poyson.

It is the common opinion of all Physitians, that those herbs, stones, or any other thing, which being put into a Serpents mouth, doth kill him, is an Antidote against his poyson. We read in *Dioscorides* of the herb Alkanet, which is very efficacious against the poyson of Serpents; and being chewed and spit out upon a Serpent, killeth him. Upon this, I thrust half a drachm of treacle or mithridate, mixt with *Aqua vitæ*, into a vipers mouth, and she died within half an hour. I made a water-serpent swallow the same, but she received no hurt by it, onely lay a small time stupified: wherefore I pressed some oyl out of the seeds of citron, and orange or

 lemons,

lemons, and dropt it into the serpents mouth, and she died presently. Moreover, a drachm of the juice of Angelica-roots will kill a serpent. The Balsame, as they call it, which is brought from the west-Indies, is excellent against them; for when I anointed their mouth and jaws with it, they died in half an hour. Balsame of the east, is a present remedy against poyson by oyntments, or the biting of a serpent, saith *Ætius*. In Arabia, where it groweth, there is no fear of poyson, neither doth any one dye of their bitings; for the fury of this deadly poyson, is allayed by the feeding of the serpents upon this pretious Balsame. But I have found nothing more excellent than the earth which is brought from the Isle of Malta: for the least dust of it put into their mouths, kills them presently. I have tried the same vertue in Lithoxylon, which Physitians use for the worms in children. There is a stone called Chelonites, the French name it Crapodina, which they report to be found in the head of a great old Toad; and if it can be gotten from him, while he is alive, it is soveraign against poyson: they say it is taken from living Toads, in a red cloth, in which colour they are much delighted; for whilst they sport and open themselves upon the scarlet, the stone droppeth out of their head, and falleth through a hole made in the middle, into a box set under for the purpose, else they will suck it up again. But I never met with a faithful person, who said that he found it: nor could I ever find one, though I have cut up many. Neverthelesse, I will affirm this for truth, that those stones which are pretended to be taken out of Toads are minerals; for I remember at Rome I saw a broken piece of stone, which was compacted of many of those stones, some bigger, some less, which stuck on the back of it like limps on a rock. But the vertue is certain: if any swallow it down with poyson, it will preserve him from the malignity of it; for it runneth about with the poyson, and asswageth the power of it, that it becometh vain and of no force.

A most perfect oyl against poyson,

often tryed in repressing the violence of it. Take three pound of old oyl, put into it two handfulls of the flower of St Johns wort, and let them macerate in it for two months in the sun. Then strain out the flowers, and put into the oyl two ounces of the flowers of the same herb, and set it to boil in Balneo Mariæ a quarter of a day. Stop the bottle close, that it may have no vent, and set it a sunning for fifteen days. In the moneth of *July*, take three ounces of the seed, stamp it gently, and steep it in two glasses of the best white-wine, with gentian, tormentil, white dittany, zedoary, and carline gathered in *August*; red sanders, long aristolochie, of each two drams: Let all these mecerate in the wine for three days; then take them out, and put them in the oyl, and boil them gently in Balneo for six hours; then strain them in a press. Adde to the expression an ounce of saffron, myrrhe, aloes, spikenard, and rubarb, all bruised, and let them boil in it for a day in B. M. at last treacle and mithridate, of each two ounces, and let them also boil in it six hours as before: then set it forty days in the sun. It must be used thus: In the plague-time, or upon suspition of poyson, anoint the stomach and wrists, and the place about the heart, and drink three drops of it in wine. It will work wonders.

CHAP. X.

Antidotes and preservatives against the Plague.

I Have spoken of poysons, now I will of the plague, being of the same nature, and cured almost by the same Medicines. I will set down onely them, which in our time have been experimented by the Neapolitanes, Sicilians, and Venetians (whilst the plague was spread amongst them) to resist the contagion of that epidemical plague, and preserve their bodies from infection.

A confection of Gillyflowers against the plague, of wonderful operation.

Gather some clove-gilliflowers in the moneth of *May*, of a red and lively colour, because they are of the greater vertue; pull them out of their husks, and clip off the

green

green end, then beat them in a marble mortar with a wooden pestle, until they become so fine as they may hardly be felt. In the mean while, take three pound of sugar for one of the flowers; melt it in a brass skillet, and boil it with a little orange-flower-water, that may quickly be consumed. When it is boiled sufficiently, put in some whites of egges beaten, enough to froth and clarifie it, still stirring it, and skimming off the froth with a spoon, until all the dregs be taken out. Then put in the due weight of flowers, and stir it with a wooden slice, till it turn red: when it is almost boiled, adde thereunto two drachms of cloves beaten with a little musk, the mixture of which will both add & excite a sweet sent and pleasantness in the flowers Then put it into earthen pots, and set it up: if you add a little juyce of lemon, it wil make it of a more lively blood-colour. We may also make Lozenges and round Cakes of it, by pouring it on a cold marble. If any would do it after the best manner, they must extract the colour of the flowers, and boil their sugar in that infusion, for so it will smell sweeter. Some never bruise the flowers, but cut them very small with sizers, and candy them with sugar; but they are not very pleasant to eat. This confection is most grateful to the taste, and by reason of the sent of the cloves, very pleasant. The vertues of it are these, as I have found by experience: it is good for all diseases of the heart, as fainting, and trembling thereof; for the megrum and poyson, and the bitings of venimous creatures, and especially against the infection of the plague. There may be made a vinegar, or infusion of it, which being rub'd about the nostrils, is good against contagious air, and night-dews, and all effects of melancholy.

Against the Plague.

Gather Ivy-berries in *May*, and wilde Poppies before the sun rise, lest they open; In *April* gather goats rue: dry them in the shade, and make them into powder. One drachm of it being drank in wine, is excellent against infectious diseases. The Bezoar stone, brought from the west-Indies, being hung about the neck nigh to the heart; or four grains of it in powder, being taken in wine, is good against the plague, and the infection of all pestilential feavors, as I can testifie: And taketh away soundings, and exhilarateth the heart. The water or oyl, extracted from the seeds of Citron, is a very strong Antidote against the plague. *Apparitius Hispanus*, his oyl is also approved against the same.

Chap. XI.

Remedies for wounds and blows.

There are some remedies for wounds and blows, which shall not be omitted, for I have found some of them to be of wonderful vertue.

The oyl of Hispanus for wounds and other things.

Take two pound of new wax, four ounces of wax, as many of linseed, two ounces of rosemary-flowers, and bay-berries, as many of betony; of chamomil-flowers, or the oyl of it, three ounces; of cinnamon an ounce and a half, as much of St Johns wort, or the oyl of it, two ounces of old oyl. Dry the flowers and herbs in the shade; and when they are withered, beat them, and seirce them through a sieve. Melt the wax on the fire, then pour in the oyls, next the powders, still stirring them with a stick. At length, pour it on a marble, and cut it into small slices, and put it into a glass retort; stop it close with straw-mortar, and set it on the fire with his receiver; stop the joynts, and give the inclosed no vent, lest the virtue flye out and vanish away. First, by a gentle fire draw out a water; then encreasing it, and changing the glass, draw a red oyl; stop them close, and keep them for use: the qualities of it are heating; by anointing the neck, it cureth all creeks that are bred by cold; it healeth wounds, helpeth the contraction of the nerves caused by cold; it mollifieth cold gouts, and taketh away the trembling of the hands; It may be drank for the Sciatica, taken in wine; it helpeth the quinsie: by anointing the reins of the

back, and the belly, or by drinking the water or oyl in wine, it will break the stone and bring it down, and asswageth poyson. For deafness, you must steep some wool in it, and stop the ears with it: anoint the belly and back in any pain there. Being drunk in vinegar, it cureth the falling sickness, and restoreth lost memory; it provoketh the menstrues in women, by anointing their privities with it, or by drinking some drops of it in wine; taken in the same manner, it provoketh appetite, being taken early in the morning; and is good against the bitings of Scorpions: Drink it going to bed, or when you arise in the morning, and it will cure a stinking breath.

For cold aches.

Oyl of Herns is excellent to allay and remove all cold aches, the gout, sciatica, griefs of the sinews, convulsions, pain in the joynts, cold defluctions, and other diseases of moisture and cold. In the Diomedian Isles, now called Tremity, in the Adriatique Sea, there are birds, commonly called Hearns, who breed there, and continue there, and are to be found nowhere else: they are a kind of Duck, feeding on fish, which they catch in the night: they are not to be eaten, though they be very fat, because they savour of the rankness of fish. Kill these birds, and pluck off their feathers; draw them, and hang them up by the feet, there will drop from them a certain black yellowish oyl, very offensive to the nose, being of a noisome fishy smell. This oyl being applied to any place, as much as you can endure, will do the effects before mentioned, and more: but it is very hurtful for any hot maladies. There is a water also

For old Sores.

Take lime unkilled, and dissolve it in water; stir it three or four times in a day; then when it is settled and cleared, strain it and keep it; wet a linnen cloth in it, and apply it to a wound or sore, and it cureth them. I will not omit

The vertues of Tobacco.

Out of the seeds of it is expressed an oyl, three ounces out of a pound, which allays the cruel tortures of the gout: the juyce clarified and boiled into a syrup, and taken in the morning, maketh the voyce tunable, clear and loud; very convenient for singing Masters. If you bruise the leaves, and extract the juyce, it killeth lice in childrens heads, being rubbed thereon. The leaves cure rotten Sores and Ulcers, running on the legs, being applied unto them. The juyce of this herb doth also presently take away and asswage the pain in the codds, which happeneth to them who swimming do chance to touch their codds.

CHAP. XII.

Of a secret Medicine for wounds.

THere are certain Potions called Vulnerary Potions, because, being drunk, they cure wounds: and it seemeth an admirable thing, how those Potions should penetrate to the wounds. These are

Vulnerary Potions.

Take Pirole, Comfrey, Aristolochy, Featherfew of each a handful; of Agrimony two: boil them in the best new Wine: digest them in horse-dung. Or take two handfuls of Pirole, of Sanicle, and Sowe-bread one, of Ladies Mantel half one. Boil them in two measures of Wine, and drink it morning and evening. Binde the herbs, which you have boiled, upon the wound, having mixt a little salt with them: and in the mean while use no other Medicine.

The Weapon-Salve

Given heretofore to *Maximilian* the Emperor, by *Paracelsus*, experimented by him, and always very much accounted of by him while he lived: It was given to me by a noble

noble man of his Court. If the Weapon that wounded him, or any stick dipt in his blood be brought, it will cure the wound, though the Patient be never so far off. Take of the moss growing upon a dead man his scull, which hath laid unburied, two ounces, as much of the fat of a man, half an ounce of Mummy, and man his blood: of linseed oyl, turpentine, and bole-armenick, an ounce; bray them all together in a mortar, and keep them in a long streight glass. Dip the Weapon into the oyntment, and so leave it: Let the Patient in the morning, wash the wound with his own water; and without adding any thing else, tye it up close, and he shall be cured without any pain.

Chap. XIII.

How to counterfeit infirmities.

IT hath been no small advantage to some, to have counterfeited sicknesses, that they might escape the hands of their enemies, or redeem themselves for a small ransom, or avoid tortures; invented by former ages, and used by these latter. I will first teach you

How to counterfeit a bloody Flux.

Amphiretus Acantius, being taken by Pirates, and carried to *Lemnos*, was kept in chains, in hope that his ransom would bring them a great sum of money. He abstained from meat, and drank Minium mixt with salt water. Therefore, when he went to stool, the Pirates thought he was fallen into a bloody Flux, and took off his irons, lest he should dye, and with him their hopes of his ransom. He being loose, escaped in the night, got into a Fisher-boat, and arrived safe at Acantum: so saith *Polianus*. Indian Figs, which stain the hands like ripe Mulberries, if they be eaten, cause the urine to be like blood: which hath put many into a fright, fearing they should dye presently. The fruit of the Mulberry, or Hoggs blood boiled and eaten, maketh the excrements seem bloody. Red Madder maketh the urine red, saith *Dioscorides*. We may read also, that if you hold it long in your hand, it will colour your urine. I will teach you also

To make any one look pale.

Cumine taken in drink causeth paleness: so it is reported, That the Followers of *Portius Latro*, that famous Master of Rhetorick, endeavored to imitate that colour which he had contracted by study. And *Julius Vindex*, that assertor of liberty from *Nero*, made this the onely bawd to procure him an executorship. They smoke themselves with Cumine, who disfigure their faces, to counterfeit holiness and mortification of their body. There is an experiment also, whereby any one may know how

To cause Sores to arise.

Take Perwinckle, an herb of an intolerable sharpness, that is worthily named Flammula; bruise it, and make it into a plaister, and it will in a short space ulcerate, and make blisters arise. Cantharides beaten with strong water, do also raise watry blisters, and cause ruptures.

Chap. XIV.

Of Fascination, and Preservatives against inchantments.

NOw I will discourse of inchantment; neither will I pass over in silence, who they are whom we call Inchanters: For if we please to look over the Monuments of Antiquity, we shall finde a great many things of that kind delivered down to posterity. And the tryal of later ages doth not altogether explode the fame of them: neither do I think that it derogateth from the truth of the stories, that we cannot draw the true causes of the things, into the streight bonds of our reasons, because there are many things that altogether impede the enquiry: but what I my self judge of others opinions, I thought fit here to explicate. You may find many things in *Theocritus* and *Virgil*, of this kind: whence that verse arose:

There's

There's some, I know not whose unlucky eye
Bewitcheth my yong Lambs, and makes them die.

Isigonus and *Memphedorus* say, There are some families in *Africa*, that bewitch with their tongue the very Woods: which if they do but admire somewhat earnestly, or if they praise fair trees, growing corn, lusty children, good horses, or fat sheep, they presently wither, and die of a suddain, from no other cause or harm: which thing also *Solinus* affirmeth. The same *Isigonus* saith, there are amongst the Triballians and Illyrians, certain men, who have two pupils in each eye, and do bewitch most deadly with them, and kill whatever they look earnestly on, especially with angry eyes; so pernicious are they: and yong children are most subject to their mischief. There are such women in Scythia, called Bithiæ, saith *Apollonides*. *Philarchus* reporteth of another kind, called Thibians in Pontus, who had two pupils in one eye, and in the other the picture of a horse; of which *Didymus* also maketh mention. *Damon* relateth of a poyson in Ethiopia, whose sweat would bring a consumption in all bodies it touched: and it is manifest, that all women which have two pupils in one eye, can bewitch with it. *Cicero* writeth of them; so *Plutarch* and *Philarchus* mention the Paletheobri, a Nation inhabiting in part of the Pontick Sea, where are Inchanters who are hurtful, not onely to children that are tender and weak, but to men of full growth, who are of a strong and firm body; and that they kill with their looks, making the persons languish and consume away as in a consumption. Neither do they infect those onely who live among them, but strangers, and those who have the least commerce with them; so great is the power and witchcraft of their eyes: for though the mischief be often caught in copulation with them, yet it is the eyes that work; for they send forth spirits, which are presently conveyed to the heart of the bewitched, and so infect him. Thus it cometh to pass, That a yong man, being full of thin, clear, hot, and sweet blood, sendeth forth spirits of the same nature; for they are made of the purest blood, by the heat of the heart: and being light, get into the uppermost parts of the body, and flye out by the eyes, and wound those who are most porous, which are fair persons, and the most soft bodies. With the spirits there is sent out also a certain fiery quality, as red and blear-eyes do, who make those that look on them, fall into the same disease: I suffered by such an accident my self: for the eye infecteth the air; which being infected, infecteth another: carrying along with it self the vapors of the corrupted blood, by the contagion of which, the eyes of the beholders are overcast with the like redness. So the Wolf maketh a man dumb; so the Cockatrice killeth, who poysoneth with looking on, and giveth venimous wounds with the beams of his eyes: which being reflexed upon himself, by a looking-glass, kill the Author of them. So a bright Mirror dreadeth the eyes of an unclean women, saith *Aristotle*, and groweth cloudy and dull, when she looketh on it: by reason that the sanguine vapour is contracted by the smoothness of the glass into one place; so that it is spotted with a kind of little mist, which is plainly seen; and if it be newly gathered there, will be hardly wip'd off. Which thing never happeneth on a cloth or stone, because it penetrateth and sinketh into the one, and is dispersed by the inequality of parts in the other. But a Mirror being hard and smooth, collecteth them entire; and being cold, condenseth them into a dew. In like manner almost, if you breath upon a clear glass, it will wax moist as it were with a sprinkling of spettle, which condensing will drop down: so this efflux of beams out of the eyes, being the conveyers of spirits, strike through the eyes of those they meet, and flye to the heart, their proper region, from whence they rise; and there being condensed into blood, infect all his inward parts. This stranger blood, being quite repugnant to the nature of the man, infects the rest of him, and maketh him sick: and there this contagion will continue, as long as he hath any warm blood in his body. For being a distemper in the blood, it will cast him into a continual feaver; whereas, if it had been a distemper of choler or flegme, it would have afflicted him by intervalls. But that all things may be more distinctly explained, you must know first, that there are two kind of Fascinations mentioned by Authors: One of Love, the other of Envy or Malice.

Malice. If a person be ensnared with the desire of a fair and beautiful woman, although he be caught at a distance, yet he taketh the poyson in at his eyes, and the Image of her beauty settleth in the heart of this Lover, kindleth a flame there, which will never cease to torment him: For the soft blood of the beloved, being strayed thither, maketh continual representations of her: she is present there in her own blood; but it cannot settle or rest there, for it continually endeavoureth to flye homeward, as the blood of a wounded person spirts out on him that giveth the blow. *Lucretius* describeth this excellently:

He seeks that body, whence his grief he found;
For humors always flow unto a wound.
As bruised blood still runs unto the part
That's struck, and gathers where it feels the smart:
So when the murtheress of his heart's in place,
Blushes arise, and red orespreads his face.

But if it be a Fascination of Envy or Malice, that hath infected any person, it is very dangerous, and is found most often in old women. Neither can any one deny, but that the diseases of the minde do distemper the body; and that the good disposition of it, doth strengthen and corroborate the same: and it doth not work this alteration onely in its own body, but on others also, by how much it stirreth up in the heart inward desires of love and revenge. Doth not covetousness, grief, or love, change the colour and disposition? Doth not envy cause paleness and meagerness in the body? Doth not the longing of the mother, imprint the mark of what she desired upon the tender Embryo? So when Envy bends her fierce and flaming eyes, and the desire of mischief bursts thereout, a vehement heat proceedeth from them, wch infecteth those that stand nigh, especially the beautiful; they strike them through as with a sword, set their entrails on fire, and make them wast into a leannness, especially if they be of a cholerick or sanguine complexion; for the disease is easily fed, where the pores are open, and the humors thin. Nor is it the passions of the mind onely, that affecteth the body thus: but the body it self, as *Avicenna* proveth, may be endued with venimous qualities: many are so by Nature; so that it cannot seem a wonder, if sometimes some are made so by Art. The Queen of India sent to *Alexander* a very beautiful maid, anointed and fed with the poyson of Serpents, as *Aristotle* saith, and *Avicenna* from the Testimony of *Rufus*. *Galen* Writeth of another, who eat Henbane without any harm; and another, Woolf-bane; so that a Hen would not come near her. And *Mithridates* (as old Histories deliver it to us) King of *Pontus*, had so strengthened himself against poyson, that when he would have poysoned himself, lest he should fall into the hands of the Romans, nothing would do him any hurt. If you give a Hawk a Hen fed with snakes or lizards flesh, or with barly boiled in the broth of them, it will make him mew his feathers betimes: and many other such things are done, which are too long to be recounted. So many men are of such a nature, that they will cure some diseases onely with their stroaking. Many eat Spiders and wilde Olives, and care not for the biting of Serpents, nor suffer any wasting or consumption, if they be of such a nature, that their looks or breath will not onely blast men, but plants and herbs, and any other thing, and make them wither away: and oftentimes, where such kind of creatures are, you may find blasted corn, poysoned and withered, meerly by the contagion of their eyes, the breath that cometh from them. Do not women in the time of their courses, infect cucumbers and melons, by touching or looking on them, so that they wither? Are not children handled with less prejudice by men then women? And you will find more women then men witches, by reason of their complexion; for they are farther distant from a right temper, and eat more unwholesome food; so that every moneth they are filled with superfluities, and purge forth melancholy blood: from whence vapors arise, and flie out through their eyes, poysoning those that stand nigh them, and filling them with the same kind of blood. Hence sanguine complexioned men, and somewhat cholerick, who have large, shining, gray eyes, and live chastly (for too often copulation exhausteth the moisture) who by

frequent glances, and continual imagination, encounter point to point, beams to beams, eyes to eyes, do generally stir up love. But why a man is taken by this Fascination with one, and not another, appeareth by the former, and this reason: for it happeneth from the intention of the Inchantor, who by those spirits or vapors, is transmitted into the bewitched person; and he receiving them, is made like unto him: For the infection seizing on his mind, and fixing in his imagination, becomes a permanent habit, and maketh the spirits and blood obedient to it; and so bindeth the imagination, and inflameth them with the thing beloved. Although the mind (which opinion is fathered upon *Avicen*, neither doth it want his authority) can of its own will and power, produce such passions. *Musæus* will have the eyes to lay the foundation of Love, and to be the chief allurements of it. And *Diogenianus* saith, That Love is begotten by looks, affirming that it is impossible for a man to fall in love unawares. So *Juvenal* placeth that Lover among prodigies,

Who burnt with Love of her he never saw:

For the bright glances of the eyes, driveth the Object into a kind of madness, and teach the rudiments of Love. The other parts are scarce any cause of Love, but provoke and entice the beholder to stay, and gaze a while upon their beauty, whilst the eyes wound him; for there they say, *Cupid* lieth in ambush with his bowe, ready to shoot his arrows into the beholders eyes, and set his heart on fire. *For thy eyes slide in through my eyes* (saith *Apuleius*) *and raise a cruel fire within my heart.* Now I have discovered the original of it unto you; unless you are quite mad, you may many ways fortifie your self against it. But many one may well wonder, considering those diseases which come by infection, as the itch, scabbiness, blear-eyes, the plague, do infect by sight, touching or speaking, and presently cause putrefaction, why Love's contagion, which is the greatest plague of all, doth not presently seize upon men, and quite consume them: Neither doth it infect others onely, but sometimes it returneth upon it self, and the persons will be ensnared in their own charms: It is reported by the Antients of *Eutelides*, that he bewitched himself by reflection in water, looking-glasses, or fountains, which returned his own shadow upon him. So that he seemed so beautiful unto himself, that falling in love with that wherewith he used to entrap others, he lost his former complexion, and died a Sacrifice unto his own Beauty. So children oftentimes effascinate themselves, when their parents attribute it to haggards and witches. Now take

Some Preservatives against Love.

There are many prescribed by wise antiquity. If you would endeavor to remove the scharms of love, thus you may expel them. Turn your face away, that she may not fasten her eyes on yours, nor couple rays with you; for you must remove the cause from the place, where it useth to make its impression: forsake her company, avoid idleness, employ your mind in business of concernment; evacuate blood, sweat, and other excrements in a large quantity, that the infection may also be voided with them.

A Preservative against Envy.

If it be the witchcraft of Envy, you may know it thus. The infected loseth his colour, hardly openeth his eyes, always hangeth his head down, sighs often, his heart is ready to break, and sheddeth salt and bitter tears, without any occasion or sign of evil. To disencharm him, because the air is corrupted and infected, burn sweet perfume to purifie the air again, and sprinkle him with waters sweetned with cinnamon, cloves, cypress, lignum aloes, musk, and amber. Therefore the old custome is continued until this day, and observed by our women, to smoke their children, and rowl them about in frankincense. Keep him in an open air, and hang Carbuncles, Jacinthes, or Saphires about his neck. *Dioscorides* accounteth Christs Thorn, wilde Hemp, and Valerian, hung up in the house, an amulet against witchcraft. Smell to Hyssope, and the sweet Lilly; wear a ring made of the hoof of a tame or wilde Ass; also Satyrion, the male and female, are thought the like. *Aristotle* commendeth Rue, being smelt to. All these do abate the power of witchcraft.

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How to adorn Women, and make them Beautiful.

The Proeme.

Since next to the Art of Physick, follows the Art of Adorning our selves, we shall set down the Art of Painting; and how to beautifie Women from Head to Foot, in many Experiments: yet lest any man should think it superfluous, to interpose those things that belong to the Ornaments of Women, I would have them consider, that I did not write these things for to give occasion to augment Luxury, and for to make people voluptuous. But when God, the Author of all things, would have the Natures of all things to continue, he created Male and Female, that by fruitful Procreation, they might never want Children: and to make Man in love with his Wife, he made her soft, delicate and fair, to entice man to embrace her. We therefore, that Women might be pleasing to their Husbands, and that their Husbands might not be offended at their deformities, and turn into other womens chambers, have taught Women, how, by the Art of Decking themselves and Painting, if they be ashamed of their foul and swart Complexions, they may make themselves Fair and Beautiful. Somethings that seemed best to me in the Writings of the Antients, I have tried, and set down here: but those that are the best, which I and others have of late invented, and were never before in Print, I shall set down last. And first I shall begin with the Hairs.

Chap. I.

How the Hair may be dyed Yellow, or Gold-colour.

Since it is the singular care of Women to adorn their Hair, and next their Faces; First, I will shew you to adorn the Hair, and next the Countenance. For Women hold the Hair to be the greatest Ornament of the Body; that if that be taken away, all the Beauty is gone: and they think it the more beautiful, the more yellow, shining and radiant it is. We shall consider what things are fit for that purpose; what are the most yellow things, and will not hurt the Head, as there are many that will: but we shall chuse such things as will do it good. But before you dye them,

Preparing of the Hair

must be used, to make them fit to receive a tincture. Add to the Lees of White-wine as much Honey that they may be soft, and like some thin matter: smeer your Hair with this, let it be wet all night: then bruise the Roots of Celandine, and of the greater Clivers Madder, of each a like quality: mingle them, being bruised, very well with Oyl, wherein Cummin-Seed, Shavings of Box, and a little Saffron, are mingled; anoynt your Head, and let it abide so twenty four hours: then wash it with Lye made of Cabbage-Stalks, Ashes, and Barley-Straw: but Rye-Straw is the best: for this, as Women have often proved, will make the Hair a bright yellow. But you shall make

A Lye to dye the Hair

thus: Put Barley-Straw into an Earthen-pot with a great mouth, Feny-Græc. and wilde Cummin; mingle between them, Quick-lime and Tobacco, made into Powder: then put them upon the Straw beforementioned, and pour on the Powders again; I mean by course, one under, the other over, till the whole Vessel be full: and when they are thrust close, pour on cold water, and let them so stand a whole day: then open a hole at the bottom, and let the Lye run forth, and with Sope use it for your Hair. I shall teach you

Another.

To five Glasses of Fountain-water, add Alume-Fœces, one Ounce; Sope, three Ounces; Barley-Straw, one Handful: let them boyl in Earthen-pots, till two thirds be boyled away: then let it settle: strain the Water with the Ashes; adding to every Glass of Water, pure Honey one Ounce. Set it up for your use. You shall prepare for your Hair

An Oyntment

thus: Burn the Fœces of Wine, heaped up in a Pit, as the manner is; so that the fire may go round the Pit: when it is burnt, powe it, and seirce it: mingle it well with Oyl: let the Woman anoynt her Head with it when she goes to Bed; and in the morning, let her wash it off with a Lye, wherein the most bitter Lupines were boyled. Other Women endeavour

To make their Hair yellow

thus: They put into a common Lye, the Pills of Citrons, Oranges, Quinces, Barley-Straw, dried Lupines, Fœny-Græc. Broom-Flowers, and Tartar coloured, a good quantity: and they let them there lie and steep, to wash their Hair with. Others mingle two parts Sope, to one part Honey; adding Ox-Gall one half part: to which they mingle a twelfth part of Garden-Cummin, and wilde Saffron: and setting them in the Sun for six weeks, they stir it daily with a wooden-staff: and this they use. Also of Vinegar and Gold Litharge, there is made a decoction very good to dye the Hair yellow as Gold. Some there are, that draw out a strong VVater with fire, out of Salt-Peter, Vitriol, Salt-Ammoniac, and Cinaber; wherewith the Hairs dyed, will be presently yellow: but this is wont to burn the Hair: those that know how to mingle it, will have good effects of it. But these are but ordinary; the most famous way is

To make the Hairs yellow:

draw Oyl from Honey by the Art of Distillation, as we shall shew: First, there will come forth a clear VVater, then a Saffron-colour, then a Gold-colour: use this to anoynt the Hair with a Spunge; but let it touch the Skin: for it will dye it Saffron-colour, and it is not easily washed off. This is the principal above others, because the Tincture will last many dayes: and it will dye Gray-Hairs, which few others will. Or make a Lye of Oak-Ashes, put in the quantity of a Bean of Rheubarb, as much Tobacco, a handful of Barley-Straw and Fœny-Græc. Shells of Oranges, the Raspings of Guaiacum, a good deal of wilde Saffron and Liquorish: put all these in an Earthen-pot, and boyl them, till the water sink three fingers: the Hairs will be washt excellently with this. Hold them in the Sun, then cast Brimstone on the Coals, and fume the Hairs; and whilst it burns, receive the smoke with a little Tunnel at the bottom, and cover your Head all over with a cloth, that the smoke flie not away.

CHAP.

CHAP. II.
How to dye the Hair Red.

BEcause there are many men and women that are ruddy Complexions, and have the Hair of their Heads and Bearbs Red; which, should they make yellow-coloured, they would not agree with their Complexions: To help those also, I set down these Remedies: The Ancients used the decoction of the Lote-Tree raspt, which we call Melo Fiocco: and so they made their Hair Red. Or else, by burning the Fœces of the old Wine, as I said, they added Oyl of Mastick thereto, which they provided thus to the purpose. They heaped up the ripe Berries of the Mastick-Tree for some dayes, till they might wither: then they poured on water, and boyled them so long in Brazen Kettles until they brake: they put them in Bags, and pressed out the Oyl with a press. With this Oyntment, they kept their Head anoynted all the night, and so made them Red. But how we may

Dye the Hair Red

I shall teach you. There is a Powder brought to us from Africa, they commonly call Alchena: if we boyl it in a Lye till it be coloured, and anoynt our Hair with it, it will dye them red for many days, that is indelible: but whilst you handle it, take heed you wet not your Nails therewith; for they will be so died, you cannot easily make them clean. So also we dye the Tails and Mains of white Horses red. But I can easily do it with Oyl of Honey; for when the clear and Saffron-coloured waters are drawn off, increase the fire, and the Oyl will come forth, the red. This is excellent to make the Hairs red, and it will dye white Hairs red for many dayes; and when that tincture is worn off, the Hairs will shine of a golden colour. But when we anoynt our Heads with a Lye, we take a wet sponge with nippers, that we may not stain our Hands or skin of our Heads.

With Herbs a woman dy'd her hoary Head:
Arts Colours better'd Natures, as 'tis said.

CHAP. III.
How the Hairs are dyed Black.

IT is worth the while, to shew such as are ashamed to seem old, how to dye their hoary Hairs black, as if they might grow young again by it. And if we provide for young women, we must do as much for aged Matrons; especially, if it fall out that they grow hoary too soon. Of old, they made a decoction of Sage-Leaves, the green Husks of Walnuts, Sumacts, Myrtle-berries, Black-berries, Cypress-nuts, Rindes of the Roots of Halm-Tree, and such-like: for the Rinde of the Root of Halm-Tree, boyled till it be soft, and consumed, and then smeered on all night, blacks the Hair, first made clean with Fullers Earth. Learn therefore

How Gray Hairs are dyed Black.

Anoynt your Hair in the Sun with Leeches that have lain to corrupt in the blackest Wine sixty daies, and they will become very black. Or else, Let a sextary of Leeches stand in two sextaries of Vinegar in a Leaden Vessel to corrupt, for sixty daies; and as I said, anoynt your Hair. *Pliny* saith, It will dye so strongly, that unless they hold Oyl in their mouths, when they dye the Hair, it will make their Teeth black also. But if you would have

Long and Black Hair,

Take a green Lizard, and cutting off the Head and Tail, boyl it in common Oyl, and anoynt your Head with it. You shall have also

Another.

Yet you may thus dye your Hair and Beard handsomely, if they be grown Gray: Froth of Silver, burnt Brass, must be mingled with four times the quantity of strong Lye: and when it bubbles on an easie fire, wash your Hair with it; and when they are dry, wash them with hot water. I used this as the Ancients taught it: and I made a Lye of Quick-Lime and Oak-Ashes, that they commonly call the Capitel; in that I boyled Litharge of Silver: then I tried it on white Wool; for if it be dyed black, as I would have it, then I took it from the fire; or else, I boyled it longer. If it burnt the Wool, I put water to it; or else, dyed with it. Add Lytharge. Wash your Hair or Beard with this, and it will dye them with a shining black colour, and it will not be discerned: for the more you wash it, the better it will shine.

CHAP. IV.

To make Hairs part smooth.

BEcause sometimes a part is deformed with abundance of Hair, or for lack of Hair, I shall shew how to make a smooth part thick with Hair, and a hairy part smooth, by depilatories.

A common Depilatory,

which men use commonly in Baths. It consists of Quick-Lime, four parts made into Powder, Orpiment one part: boyl them. Try with a Hens Feather; when that is made bare with it, it is boyl'd: take heed you boyl it not too much, or that it stay not too long upon your skin, for it will burn: but if it chance to burn your skin, take Populeum and Oyl of Roses or Violets, and anoynt the place, and the pain will be gone. This must be done in a Bath; but if you cannot have one, let the Woman be covered with cloths very well, and let it be cast on burning Stones or Tiles, that she may receive the fume of it, and sweat. After she hath sweat, let her wash her self with her water, and wipe it off: then let her anoynt her self all over; for the parts anoynted thus, will presently grow smooth. And thus may all parts be kept free from Hair. The Ancients used these, as *Saserna*, as *Varro* reports, teacheth in his Book of Husbandry. If (saith he) you would make any one smooth from Hair, cast a pale Frog into water, and boyl it to a third part; and with that anoynt the Body. But by pale Frog we must understand a Toad: for a Frog hath no such faculty. A Salamander soaked in Oyl, will pull out the Hair. *Dioscorides.* But it will be stronger, if you steep it long in Oyl, and dissolve it. The filthy matter that is white as Milk, and is vomited up at the mouth by the Salamander, if it touch any part of the Body, all the Hair will fall off. *Dioscorides* saith, That the Sea-Scolopendra boyled in Oyl, and smeered on the part, will pluck off the Hair by the Roots. But

To make Hair grow slowly,

If you press Oyl out of Henbane-Seed with a Press, or do often anoynt the places with the juice of it, they will grow again very slowly. The same is done with the juice of Hemlock. Or to take off the Hairs, men added to Ants Eggs, red Orpiment, and Ivy-Gum, with Vinegar; and they rubbed the place where the Hair was taken away. In former times, they rubbed the down-parts of children with the Roots of Hyacinthus, and the Hair would never grow there. And therefore it is well known in trimming Medicaments sold here and there, that being smeered on with sweet Wine, keeps back the Beard, and will not let it break forth. But if you would

That Hair should never grow again,

In which business I have taken great pains, and tried many things that I found to be false; First, foment the part with hot water, and pull out the Hairs one by one

with womens nippers: then dissolve Salt-Peter in water, and anoynt the holes where the Hairs grew. It will be better done with Oyl of Brimstone, or of Vitriol: and so they will never grow again; or if they do, after one yeer, they will be very soft: do then the same again, and the parts will be bare alwayes. So I have made womens Fore-heads longer, and have taken off Hair from parts hotter then the rest.

Chap. V.

How Hair may grow again.

But for those that would have Hair grow where it should, these Remedies will do it: sometimes womens temples use to be deformed for want of Hair. I shall teach you how

Hair falling off before old age, may be held fast.

And if any Hair hath fallen off, to make it grow again, torrifie Gith upon the Coals; when it is torrified, powder it, sift it, and mingle it with water; and anoynt your Head. The Ancients made their Hair grow again with these Remedies: with the Ashes of a Land-Hedge-hog, or of burnt Bees or Flies, or the Powder of them dried; also with Man's Dung burnt, and anoynted on with Honey, to which they added well the Ashes of Small-nuts, Wall-nuts, Ches-nuts, and other Bean-like substances: for by all these mingled together, or by them single, Hair will be made to grow. But if you will

That Hair shall grow quickly,

I know that by often washing the place with that water that first distils from Honey by the fire, much Hair will soon grow; or if you do but moysten the place with wet cloths, and not wipe it, but let it alwayes continue wet. Also Noble Matrons may use this

To make the Hairs grow softer.

Augustus was wont to burn his Legs with a burning Nut, that the Hair might grow softer. But

That Hair may grow longer and quickly,

Bruise Marsh-Mallow-Roots with Hogs-grease, and let them boyl long in Wine: then add Cummin-Seed well bruised, Mastick, and yelks of Eggs well boyled: first, mingle them a little, and then boyl them: strain all through a Linen-clout, and let it stand and settle; then take the fat that swims on the top, and anoynt the Head, first washt. But to make them grow quickly, take Barley-Bread with Salt and Bears Grease: burn the Bread; and with such a mixture anoynt the place. Some besmeer a glazed Pot with the fat of a Horses Neck, and they boyl a River-Eel that is fat, and cut into pieces in it, till it dissolve into Oyl, and they anoynt the part with it.

Chap. VI.

To take away Sores and Worms that spoil the Hair.

There is a certain plague of the Hair that befals them, and breaks, cuts, and takes the Hair quite off from the Head. I will add the Remedies presently, whereby to take them away. It is healthful, in these Diseases, to apply bitter things to kill these Worms, called Tiners or Syrens: take the Flowers of Myrtle-Trees, Broom-clary: boyl them in Vinegar, till the Vinegar be consumed, and then rub the ends of the Hair continually with it. Also grinde bitter Lupines into fine Meal; boyl them in Vinegar, and then rub the Hairs between your hands: for this will kill these Sirens, and drive them away. But I used very hot Bread, newly taken forth of the Oven, cut in the middle, and putting the Hair between them till they grow cold.

CHAP. VII.
How to make Hair Curl.

CUrl'd Hair seems to be no small Grace and Ornament to the Head: and women that use painting do all they can to curl the Hair. If you will know how

To Curl the Hair,

Boyl Maidenhair with Smallage-Seed in Wine, adding a good quantity of Oyl: for this will make the Hair curl'd and thick. *Pliny.* Moreover, if you put the Roots of Daffidils into Wine, and pour this often on the Head, being shaved, it will make the Hair curl the more, as the same Author saith: or else, bruise the Root of Dwraf-elder, with Oyl, and anoynt the Head therewith, and binde the Leaves of the same upon the Head. Some say that Camels Dung will curl the Hair: or else, pound the Ashes of a Rams Horn, with Oyl; and with that anoynt the Head often, being first shaved. So also, will the Ashes of Ches-nuts or Hedge-hogs do, if you with Honey smeer the Head with it.

CHAP. VIII.
Remedies to make the Eye brows black.

BEfore we leave off to speak of Hair, I shall shew how to make the Eye-brows black, because women are as desirous of this as of the rest. The Greeks call them Calliblephara, that is, Fair Eye-brows: wherefore the Antients used

To dye the Eye-brows

with black Earth like Bitume or Sea-Cole: being burnt, it is a very fine black: and it is added to those Remedies that serve to dye the Eye-brows and the Hair black: or else the Marrow of an Ox bone taken out of the Right-Leg before, and beaten with Soot, is good to dye the Hair, and faulty Eye-brows, and the corners of the Eyes. Also, Soot is tempered for this purpose, with the smoak of Paper, and Oyl of Sesama, the smoot being wiped off of a new Vessel with a Feather. The Kernels of Dates burnt in a new earthen Pot, and the Ashes washed, serve instead of Spodium; and they are mingled with Eye-salves, and they make Calliblephara; adding Spikenard thereunto. And if they be not well burnt, burn them again. Also Rose-Leaves are fit to burn for the same use. Also, you may amend your Eye brows thus; Take Labdanum, and beat it with Wine, and mingle Oyl of Myrtles with it, and make a very thick Oyntment: or infuse in Oyl the black Leaves of the Myrtle-Tree, with a double quantity of Galls bruised, and use that. I use this. Galls are fried in Oyl, and they are ground with a little Salt-Ammoniac; and then mingled with Vinegar, wherein the Pills of the Mulberry and Bramble have been boyled: with these anoynt the Eyebrows, and let it abide on all night; then wash it off with water. But if you would

Change the colour of childrens Eyes,

you shall do it thus: anoynt the fore part of their Heads with the Ashes of the shells of Hazel-nuts and Oyl, it will make the white eyes of children black, if you do it twice. There are many Experiments to make white and gray Eyes black, and to alter the colours. But I shall let them pass, because those that want them will not so lightly endanger their Eyes; nor do they answer the expectation, as some have tried them.

CHAP.

Chap. IX.

How to make the Face white.

I Taught formerly in my Book of Plants, That with white cleer Silver-coloured Herbs, Shel-Fish, and Stones, the Face might be made white, polished and Silver-coloured. I shall now set down some examples, by which you may invent many more. I shall first speak of Simples, then of Compounds: Simples that are white, make the face white. The Lilly is a complete white colour: the bulbous tops of it, like Onyons boyled in water, or the distilled water of them, will make the Faces of Maides white, if they wash them therewith, morning and evening. With-wind bears a Flower like to the Lilly, without any smell; but within like Saffron: it is onely white, and is as it were the Rudiments of Nature, when she goes about to frame a Lilly. The distilled water from the flowers will wonderfully make the Face whole. Also with the decoction of Ivory, one may make the Face like Ivory. Melanthium makes the Face beautiful. *Dioscorides.* But it shews its excellency when it is thus prepared: Powd it, and sift out the finest of it, take the juice of Lemmons, and let the Meal of Gith lie wet in it twenty four hours; take it out, and let it dry: then break an Egg with the Shell, and mingle it with it: then dry it in the shade, and sift it once more. In the morning, when the woman riseth out of her bed, let her put this into a white Linen-clout, that is not too fine, and wet it with water or spittle; and let her rub her Face with the clout, that the moysture alone, and not the Meal, may come on the Face. If you will have

Your Face white,

it may be made as white as Milk many ways, and chiefly with these that follow: Let Litharge of Silver, half an ounce, boyl in a Glazed Earthen Pot, with strong Vinegar, until the thinner part be evaporated: set it up for use. Then, in another Pot, let half a pound of clear water boyl: then mingle both these waters together, and shake them; and it will become like Milk, and sink to the bottom: when it is settled, pour it off; water being plentifully poured in: and leaving it a while to settle, pour it off again, and pour on fresh; shake it, and leave it to settle a short time, and so forbear. That which is settled, set in the Sun; and when it is grown stiff, as thick pap, make small balls of it, and lay them up. You may use these with water to make the Face white. Or else powder Lytharge of Silver, eight ounces, very fine: pour on the Powder, of the strongest Vinegar five pints: distil them, and keep them for your use. Then take Allome de Plume, Salt Gemma, one drachm; Frankincense, one ounce and a half; Camphire, two drachms; Oyl of Tartar, six ounces; Rose-water, one pound: powder what must be powdered, and pour it in: distil the water in Chymical Vessels, and set it up. When you would use them, mingle a little of both waters in the palm of your hand, and it will be like Milk: rub your Face with it, and it will be white. Or else take off the Pills of about twenty Citron Lemmons; infuse the Pills in one pound of the best Wine, and one pint and an half of Rose-water, for six days: then add one ounce of white Lilly and Mallow-Roots, and let them stay as many days: then add Rosin of Turpentine, four ounces; white Mercury sublimate, two ounces; Boxan, half an ounce; ten whites of Eggs made hard at the fire: and mingle all these together: let them stay one night. The next day, put a cap upon the Vessel, and luting the joynts well, that nothing may breath forth, let the water drop into a Vessel to receive it: set it aside for use. I use this, that is easie to make, and doth the business completely: Take the white of an Egg, and stir it so long with an Iron, that it froth well: let it stand to turn to water: then take half an ounce of the best Honey, and beat with that water, and mingle them until they unite: add to them the quantity of two Corns of Wheat, of Mercury sublimate, finely powdered; when you go to bed, take some of the water in the palm of your hand, and wash your Face; and so let it dry in, that it may not stick to the Linen: in the morning, wash it off with Fountain-water, and you shall finde your Face cleer and white.

CHAP. X.

How women shall make their Faces very clean to receive the Colour.

BEfore any thing be used to make the Face beautiful, it must be made very clean and fit to receive it: for oft-times women have excellent Waters and Remedies brought them, but they have no operation: wherefore the matter is, that they must first prepare their Face. This is the best

Preparation of the Face.

Bind Barley-Meal-Bran in a Linen-cloth, and let it down into a Pot full of water, and let it boyl till a third part be remaining, and press out the juice: with this decoction wash your face, and let it dry: then bruise Myrrh, and mingle it with the white of an Egg, and burn it on hot Fire-sticks, or red hot Tiles, and receive the fume by a tunnel: let the narrow part of it be toward the Face, and the broad to the fire: cover the head with a Napkin, that the smoak flie not away; and when you have received sufficient of the smoak, rub your Face with a Linen-cloth: then use your Remedy to anoynt your Face. I shall shew you

One that is stronger.

When the skin must be cleansed or made white, you must cleanse some parts of your Face from skins that will not let your painting Oyntments stick. Powder an ounce of Sublimate very finely: put it into a Pot that is glazed, and cast into it six whites of Eggs, so beaten, that they are turned into water: then boyl them on hot Embers, till they grow thick: put them into a Linnen-cloth that is loosly weaved, and press the water out of them with your hands, and wash your Face with it: then mingle Honey, whites of Eggs, and the aforesaid water together, equal parts: put some in your palm, and rub the place you would make white, with the palms of your hands: then boyl spelt; and when it is boyl'd, take the fume of it by a tunnel: then rub your Face with a course Linnen-cloth. Others wash their Face with water, wherein fine flour is boyled.

CHAP. XI.

How the Face may be made very soft.

THe next Beauty of the Face and Hands, is Tenderness, which is procured by fat things; and chiefly by Milk, and principally of Asses: for it takes off wrinkles, and makes the skin white and soft. And therefore, it was not for nothing, that *Poppæa Sabina, Nero*'s wife, had always five hundred Asses with her: and in a Bath with a sear, she soaked all her body with that Milk. Wherefore if you would have

Your Face made soft and white,

Steep crums of Bread in Whey or in Milk; then press it out, and with that water wash your Face; for it will wonderfully white your Face, and make the skin fair. Or, take six Glasses of Milk, steep crumbs of Bread in it five hours: take ten Lemmons, make clean the Pills, and cut the Body of them into thin slices: then shake ten whites of Eggs; bruise an ounce of Camphire, Allom Sauharinum, two ounces; mingle them all, and distil them, and set it in a glazed Vessel close covered, in the Sun; and then set it up for your use. Here is one stronger

For the same purpose.

Boyl two Calfs Feet in water; first make them clean: then boyl the water till half be consumed; put it in Rice one pound, and boyl it well: let crums of Bread steep in Asses Milk or Goats Milk, with ten whites of Eggs bruised with their Shells: distil all at a gentle fire, add to the water a little Camphire and Borax: put into a glazed vessel, two yong naked Pigeons, with their guts taken forth, and put in as much Milk as will cover them; and add one ounce of Borax; Turpentine, three ounces; Camphire, one ounce; five whites of Eggs: put on the cover, and distil them; for it is fat things that make the Face soft. I shall say more, when I come to speak of making the hands white and soft: the reason is the same for both.

Chap. XII.
How to make the face clear and shining like silver.

THe face is not onely made clear, but white as silver, by those things that I said were white as silver; yet not exactly as silver, but they shine as clear as silver. There is an herb commonly called Argentaria, or Argentina, or wilde Tansey, whose leaves are green above, but on the backside they shine of a silver colour: the distilled water of it is drank by women against spots in their faces, and to make them white as silver. The snails that are found in moist places, and leave behind them, as they creep, a silver cord (*Dioscorides* saith, will cure the spots in the face) women much desire them: for they put them in a still and draw out water from them, that polisheth the skin exceedingly, and makes it contract a silver glass. And the sea-shell-fish, like an ear, whose shell is of a silver colour within, or pearl colour, and many kinds of shells; that being steeped in vinegar, will grew pure, casting off the outward crust; as the Oystershel doth that brings forth pearl. There are also shells, we call the Mothers of pearl, that inwardly are shining, and of a silver colour, like pearls: all which women use for their art of beautifying themselves for they make the face smooth, and to shine as white as silver. But pearls do it best of all things, when they are dissolved in sharp juyces, and soaked in rotten dung, till they send forth a clear oyl, that is the best thing to beautifie the face, as I shall shew elsewhere. For the same use, is a glass-stone used, that shines like silver But no better water is prepared, then from Talk, or Quick-silver, as I shall shew in that which follows.

Chap. XIII.
How to dissolve Talk for to beautifie women.

THough I shall speak in a work, on purpose, more at large, how Talk may be dissolved into water or oyl. We shall here onely set down, how it may be fitted for womens use. Of all such ways as are used, I shall set forth such as I have tried to be good. Beat Talk in a mortar of metal; then put it into a pot of the strongest clay, and cover it, and bind it in with strong iron wyer; lute it well all over, and stop the joynts that nothing breathe out; and set it in the Sun to dry. Then put this stone in an oven, that flames strongly, or in some other place, where the fire is most vehement. When the fire of the oven is out, take it forth and break the vessel; and if it be well calcined, it is enough: Otherwise do the same again, until the calx of it be as white as it ought to be. When the calcined body of it, is white, as it must be, grind it on a porphyry-stone, and put it into a little bag, or upon a marble in a very moist place, or deep well, or cistern; and let it lie there long, and with much moisture it will drop forth at last: It will more easily and perfectly dissolve into water, if it were burnt long enough, and turned into a calx. For the parts being turn d to lime, and made exceeding dry by force of fire, they attract moisture. It is also done

Another way

that is good. Calcine the Talk, and put it in an earthen pot, and set it in the hottest part of a potters oven, to stay there six days. When the Talk is thus turn'd to a calx, put it into a gourd-glass, which you shall first make clean, and make a hole at the bottom of it: and setting a vessel under it, you shall have the moisture of it drop forth, and the calx will resolve into water: put this into a glass viol, and let the water evaporate in Balnes: take the sediment out for your use. I use also

Another way:

Put snails in an earthen vessel, in the open air, that they may be kept hungry three days, and pine for want of meat, and be purged; then take a silver Loadstone, or Talk, most finely powdred, mingle it with the white of an egge, and make an ointment; anoint the earthen vessel with it, and put the snails into it, for they will eat up all the Talk: When they have eaten all, and voided their excrements, bruise

the snails with their shells; and putting them into a retort, draw out their moisture with a gentle fire; the humour that drops forth, will exceedingly adorn the face.

CHAP. XIV.
The preparation of Sublimate.

I Said, that there was nothing better than quick-silver for womens paints, and to cleanse their faces, and make them shine. Wherefore, I shall set down many ways to Prepare it, that you may have the use of it to your desire. Take one ounce and half of pure quick-silver, not falsified with lead: for if there be lead mingled with it, all Your labour is lost. How it must be purged and known, I taught elsewhere. Mingle this with half a pound of Mercury sublimate, and put it into a marble mortar, and with a new wooden pestle, stir it well, turning it round about. First, it will be black, in six hours it will grow white, if you cease not to beat it. Then adde one ounce and half of white salt, always turning it about with the pestle; for the more you grind it, the perfecter it will be. When it is very well ground, it must be washt. Sprinkle boiling clear water into the mortar, and stir it; and then stay a while, until the muddy part may sink down, and the filth that was lighter, and swims on the top: laying the vessel on one side, pour out the water gently, and pour in fresh; do this five or six times in the same manner, until the pure and onely powder remain without dregs: make little cakes of it, and dry it in the sun. Some whilst they bruise it, sprinkle water on, lest the powder by grinding should be made so small, that it should fly away into the air. The chief business is to purge it, and grind it well, that it be not troubled when it is strain'd forth: that which is gone to the bottom, and so part of it be lost; some open a hole in the belly of a pot, that when it is settled, the hole being opened, the water with the dregs may run forth. Others to sublimate, adde a third part of quick-silver, and grind it in a wooden mortar; and in the mean while they chew four grains of mastick in their mouths, and they spit the clammy spittle out of their mouths into the mortar, until it be white, as I said: then they boil it in one pound of the distilled water, of Bryony-root, till it be consumed: then they put a linnen cloth, to receive it at the mouth of the vessel, and so they strain it forth, and set it in the sun: they make troches of it with gum Traganth; others to sublimate, add a sixth part of quick-silver, bruising it round about: then they adde camphir, borax, and ceruss, half as much, and mingle all together. The principal matter is, it is the best way to sprinkle it with water whilst you grind it, lest by grinding it, the powder become so light, that it fly away: also, when the water is poured on, all the filth will come on the top, and more easily be poured off: then when the sublimate is washed, it is left to settle down: then again pouring off the former water, they pour on fresh, and they wash it oft, till they see it is enough, and no black swims on the top. But there is no better, as we said, than

Water of quick-silver.

But some will not away with quick-silver, by reason of the hurt it commonly doth to the teeth: but they use other water. Yet there is no better water, then that which is extracted from quick-silver; it is so clear and transparent, and the face anointed with it, shines like silver: it draws the skin handsome, and makes it soft by and by; and I never saw a better: the manner was shewed before.

CHAP. XV.
How white-lead is prepared for the face.

BEcause sublimate is so dangerous, there is a private way to do it with ceruss, but not the usual way, that women may have their desire, without hurting their skin or their teeth. I am now come to the business of ceruss. Take of swines grease well

well washed and cleansed in common water, at least ten times: put it into a lye of sweet water, and after fifteen days, into a pot, or earthen vessel, with a broad mouth; pouring in the sharpest vinegar, put in your swines grease, that the vinegar may swim three fingers above it: then fasten a plate of lead on the mouth of the pot, well luting the joynts with linnen cloths, that the vinegar may not evaporate. Every fifteen days take off the cover, and see how it is, if the lead be dissolved, and scrape the cover of all that hangs upon it, and put in the cover, anoint it all about, and let it stand so long, till all the rest be performed, as I said before, and the whole lead be turned to ceruss. Ceruss must be washt thus: Pour water into a vessel, put the ceruss into it; stir it up and down, that what dregs there is may swim on the top: the ceruss is heavy, and will sink to the bottom: Pour forth what swims above in the vessel, and pour on fresh water; and do this so often, until the pure ceruss be found without dregs: dry it, and lay it up. If you will do it

Another way,

Take two handfuls of cleansed barley, let it steep all night in fair water; then dry it on a linnen cloth, spread abroad in the sun. When it is dried, poun it in a marble mortar; when it is bruised, put it into a glazed vessel, which is full of vinegar, and cast upon this four whole eggs, with their shells: then stop the vessel with a plate of lead, that is arched, or not very even, and let there be no place that gives vent. Set it half in the sand, and let it stand in the open sun; after ten days, take off the covering of the vessel, that you stopt it with; strike down the ceruss that is in it with a feather, and scrape it off: then take the eggs out, and put in new, and do as you did; and afrer so many days scrape it off, until the whole plate be consumed. Let down the ceruss you have stricken off, into a vessel full of water, bound up in a linnen cloth that is clean, and moderately fine; and stir it in the water, carrying it about here and there, until the muddy part of it run forth, and the sediment remain in the cloth: let the water settle, and strain it, and pour it forth, changing the water so long, until no dregs remain. Lastly, strain forth the water, and lay up the powder when it is dry. This alone with fountain-water, will make the face white, mingled with the white of an egge, and will make it shine. Some

Another way

wash ceruss, and make it pure. Mingle hards of hemp, with whites of eggs well stirr'd: role up the ceruss in the middle of it: and wrapping a cloth about it, boil it one hour in a new earthen pot, putting water to it: as it boils, take off the skum: then take it from the fire; and if any Lead be sunk down, cast it forth: afterwards make Troches of it with Gum-Traganth, that it may keep the better. Some bid boyl in water of white Lillies, Ceruss very finely powdered, tied up in a skin, and fastned in a Linen-cloth over it to the handle of the Vessel. The manner of boyling is the same as I first shewed. Then pour it forth into an earthen dish, and strain it gently from all its moysture: dry it fifteen days in the Sun, and keep it.

Chap. XVI.

The best Sopes for women.

I Shewed in particulars how you might procure whiteness, lustre, and softness to the Face: now shall I speak of waters made of these, that will at the same time make, if it be first rub'd clean,

The Face white, clear, ruddy and soft.

These I speak of can do it, being composed together, and distilled. Take Ceruss ready washed, one ounce; half as much Mercury sublimate; Gum-Traganth as much; Tartar, one ounce: powder all these, and put them into a young Pigeon washed and unbowelled, and sow them in: put it into a new Earthen Pot full of water, distilled by a Retort: boyl it till the flesh part from the bones; then distil it: when

you go to bed, wash you Face ; and in the morning wash it with Fountain-water: so you shall have it white, clear, soft, and well-coloured. Also you may do it

Another way.

Bruise three pound of Bean-Cods, the shells ; add two pounds of Honey, and one of Rosin of Turpentine: put them into a Vessel, and close it that nothing vent forth ; and let it ferment eight days in dung: then add four pound of Asses milk: and in the Vessel draw forth Oyl at the fire ; use this water morning and evening. If you will have

Another way,

do it thus. Distil all these severally ; Elder-flowers, and Flowers of wilde Roses, Broom, Honey-suckles, *Solomons*-seal, and Briony-Roots, sowre Grapes, and Sarcocolla: mingle equal parts of each, or distil them again, and set them in the Sun. This will be the best. I shall shew

Another for the same.

Pull off a Hens Feathers without water, take out her Entrals, cut her in pieces, let infuse one night in white-Wine: in the morning wash her in it, and press her between your hands that no Wine remain ; and then adding two Cups of white-Wine, distil her in a Chymical Vessel: then distil the Flowers of Bindeweed, Citrons, Oranges together ; and keep this water by it self. Then open Lemmons, and press out the juice. And, also take water of Bean-flowers ; then distil six cups of Asses milk, and as many of Cows-milk. You shall do the same with water of Gourds, and of Milk well boyled, and of water of Bean-flowers, and of Rosin of Turpentine. Then provide a glazed Vessel, put into it, Camphire two drachms, four ounces of Ceruss finely powdered: mingle them with the aforesaid waters, and set it in a soft Vessel in the open Air fifteen days and nights. When you would use it, wet a Linen-rag in it, and wash your Face.

CHAP. XVII.

How to make the Face Rose-coloured.

I Have made the Face white, now I will make it red, that the wife may be made wholly Beautiful for her husband. And first,

To make a pale Face purple-coloured.

And to adorn one that wants colour, use this Remedy. Take Vinegar twice distilled, and cast into it the raspings of red Sanders, as much as you please: boyl it at a gentle fire, adding a little Allom, and you shall have a red colour most perfect to dye the Face. If you would have it sweet-smelling, add a little Musk, Civet, Cloves, or any Spices. Now

Another,

Take Flowers of Clove-Gilliflowers, bruise the ends of the sprigs, and draw forth the juice ; if they be so ripe that they are black, add juice of Lemmons, that they may shine with a more clear red. With this paint your Face, and you shall have a pleasant red colour without any stinking smell ; or wet the sprigs of Clove-gilliflowers in juice of Lemmons, and set them in the Sun. Take away the old, and put in fresh, until it be as red as you would have it: let the juice dry, and the color will be most glorious. But I draw a quintessence from Clovegillflowers, Roses, Flower-gentle, with Spirit of Wine ; then I add Allom, and the juice of a Citron, and I made an excellent colour to beautifie the Face. Take

Another.

If you add to the best Wine one tenth part of Honey, and one ounce of Frankinsence, and

and then distil it, and steep in it the raspings of red Saunders until it is coloured to your minde; and then wash your Face with it: it will make your Face white and well-coloured. Also,

A Fucus that cannot be detected:

And it is so cunningly made, that it will delude all men; for a cleer water makes the Cheeks purple-coloured, and it will last long; and the cleerer the part will be, the more your wash it with it, and rub it with a cloth of Woolen. You shall draw out a water from the Seeds of Cardamiom, (which the Apothecaries call Grains of Paradise) Cubebs, Indian Cloves, raspings of Brasil and Spirit of Wine distilled: when they have been infused some time, draw forth the water with a gentle fire, or corrupt Dung, and wet your Face often with this. There are also Experiments

To colour the Body.

If you boyl Nettles in water, and wash your Body with it, it will make it red-colored, if you continue it long. If you distil Straw-berries, and wash your self with the water, you shall make your Face red as a Rose. But the Ancients dyed their bodies of divers colours; partly, for ornament; partly, for terrour: as *Cæsar* writes of the Britans going to war; for they painted themselves with wood. *Theophrastus* calls it Isatis, and we call it Guado. The Grecian-women painted themselves with wood, as *Zenophon* writes. And in our days the West-Indians crush out in Harvest-time a blood-red juice from the Roots of wilde Buglofs: which the women know well enough, whereby they cover their pale colour with a pleasant red: and so change their over-white colour with this Experiment.

Chap. XVIII.

To wash away the over-much redness of the Face.

I Have shewed you how to colour the Face, now I shall shew how to uncolour it: when the Face is too red, and women that are very red desire this. The way is:

To wash away the too-much redness of the Face,

Take four ounces of Peach-Kernels, and Gourd-Seed two ounces; pown them, and crush them out strongly, that you may draw forth an oyly Liquor: with this, morning and evening, anoynt the red Carbuncles of your face, and by degrees they will vanish and be gone.

Another.

Take Purple-Violets, Egg-shells, Saunders Camphire mingled with water: set the water in the open Air, and wash the redness therewith. Also, I know that the distilled water of white Lillies will take away the redness.

Chap. XIX.

How to make a Sun-burnt Face white.

WHen women travel in the open Air, and take journeys in Summer, the Sun in one day will burn them so black, that it is hard to take it off. I found out this

Experiment.

Beat about ten whites of Eggs till they come to water: put them in a glazed Vessel, adding one ounce of Sugar-Candy to them: and when you go to bed, anoynt your Face, and in the morning wash it off with Foutain-water. *Pliny* also saith thus.

Ano-

Another.

If the Face be smeered with the white of an Egg, it will not be Sun-burnt. With us, women that have to do in the Sun, to defend their Faces from the heat of it, that they may not be black, they defend it with the white of an Egg beaten with a little Starch, and mingled; and when the Voyage is done, they wash off this covering with Barley-water. Some do it

Another way:

rubbing their foul Skin with Melon-Rindes; and so they easily rub off Sun-burnings, and all other spots outwardly on the Skin. The Seed also bruised and rubbed on, will do it better. Also, a Liquor found in little bladders of the Elm-Tree, when the Buds first come forth, makes the Face clear and shining, and takes away Sun-burnings.

CHAP. XX.

How Spots may be taken from the Face.

Oft-times fair women are disgraced by spots in their Faces; but the Remedy for it, is this: to use Abstergents and Detergents in whiting of their Faces. Therefore,

To take off spots from the Face,

anoynt the Face with Oyl of Tartar, and let it dry on, and wash it not at all: do this for ten days: then wash it with a Lixivium, and you shall see the spots no more. If the part be not yet clean enough, do it once more. If this please you not, take

Another.

Put Quick-Lime into hot water; mingle them, and stir them for ten days. After two days, pour forth the clear water into a Brazen Vessel: then take Salt-Ammoniac between your Finger-tops, and rub it so long at the bottom of the Vessel, until you see the water become of a blew-colour; and the more you rub it, the better colour it will have, and it will turn into a Skie-colour or Purple-colour, very pleasant to behold. Wet Linen-cloths in this water, and lay them on the spots, till they be dry; and wet them again, till the spots be gone. See

Another.

Take two ounces of Turpentine-Rosin, Ceruss as much; mingle them with the white of an Egg; and stirring them well, besmeer Linen-cloths with them. And when you go to bed, let them stick to the spots: in the morning wash the place; and do the same again, till all the spots be gone. If you please, here is

Another.

The distilled water of Pimpernel, mingled with Camphire and laid to the Face, will make women that desire to be beautiful have a cleer Skin, very sightly to behold; and will take off the spots. Distil the Mulberry-Leaves; let the water stand ten dayes in the Sun: add to this, Mercury sublimate, Verdigrease, artificial Chrysocolla, called Borax, and a good quantity of the Powder of Sea-Cockle-shells finely beaten. Set it so many dayes in the Sun, and then use it. If you will

rub off the wan colour of your cheeks,

do thus; especially, for women when they are in their courses: Anoynt the place with Cerufs, and Bean-flower mingled with Vinegar; or yelks of Eggs, mingled with Honey. The same may be done with Bean-meal and Feny-Greek, smeered on with Honey. But we wipe away

Black and blew marks

thus:

thus: If you wash the black and blew places with the juice of the Leaves and Roots of Thapsia made into Cakes in the Sun, but one night, they will be taken away. *Nero Cæsar* made his Face white from the strokes he had received in his Night-walks, with Wax and Frankincense; and the next day his Face was clear against all reports. Or Oyl pressed from the Seeds of Flowers, when it is thick, will do it rarely. Or the Root mingled with equal quantities of Frankincense and Wax, (but let it stay on but two hours at most) then foment the place with Sea-water hot. Also, Wal-nuts bruised or smeered on, will take away black and blew spots. Vinegar or Honey anoynted will take away the same. So doth Garlick rubbed on: and brings black and blew to the right colour. Or the Ashes of it burnt, smeered on with Honey. The juice of Mustard-Seed, anoynted on but one night, is good for the same: or it is anoynted on with Honey, or Suet, or a Cerate. If a Briony-root be made hollow, and Oyl put into it, and it be boyled in hot Embers; if that be anoynted on, it will blot out black and blew spots. Marks that are noted upon Children by Women great with-child, when they long exceedingly, are taken away thus: Let her first eat of that Flesh or Fruit her belly full: then let her binde on that Flesh alive, or the green Fruit to the part, till it die or corrupt; and they will be gone. Or else, let her wash the place with *Aqua Fortis*, or *Regia*, and the Skin grows very black: so it will take the marks away. Do it again

For spots and beauty.

I will not omit *Ælian*'s Experiment of a Lion, which is a kinde of Locust. For in some Membranes, where the Testes are bound together, under which there are some soft Carbuncles, and tender, that are called the Lions fat; This will help people to make ill Faces look comely, mingled with Oyl of Roses; and made into an Oyntment, it will make the Face look fair and shining.

Chap. XXI.

How we may take off red Pimples.

Because red Pimples use to deform the Face; and specially, the whitest: therefore, to take them off, use these Remedies. I often, to take off

Pimples,

used Oyl of Paper; namely, extracting it from burnt Paper. I shall shew the way elsewhere, because I will not disturb the Order: where I shall speak of the Extraction of Oyls and Waters. Wherefore anoynting that on the red spots, will soon blot them out.

For the same.

Rear Eggs are good, twenty of them boyled hard cut in the middle, and the yelks taken forth: fill up the hollow places in the whites, with Oyl of sweet Almonds and Turpentine-Rosin: extract the Liquor in a Glass Vessel: use it.

Another.

Beat two Eggs well together, add as much juice of Lemmons, and as much Mercury sublimate: set it in the Sun, and use it.

Another to polish the Face.

Take Sow-bread-Roots, three parts; cleansed Barley, six parts; Tartar calcined, one part; Roots of wilde Cucumers powdered, two parts; Wheat-Bran, two handfuls: let them all boyl in Water, till a third part be consumed: then wash your Face with it.

CHAP.

CHAP. XXII.

How Tetters may be taken from the Face, or any other part of the Body.

RIng-worms will so deform the Face, that nothing can do it more: sometimes, they run upon other parts of the Body, as the Arm-pits and Thighs: there drops forth of them, a stinking water that will foul the cloths. I found these Remedies

Against Tetters.

Distil water from the Roots of Sowredock, and add to every pound of these, of Pompions and Salt-Peter, half an ounce; Tartar of white-Wine, two ounces: let them soak for some days: then distil them, and wash your Face in the morning therewith; and at night, smeer it with Oyl of Tartar and of Almonds, mingled. Oyl of Eggs is good also to anoynt them with. Yet sometimes these Tetters are so fierce, that no Remedies can cure them. I shall set down

Another,

that I have used with admirable success, when they were inveterate. In a Glass of sharp red-Wine, boyl a drachm of Mercury sublimate; then wash the place with it morning and evening: let it dry of it self. Do this three or four times, and the Tetters will away, and never come again.

Another.

Take Salt-Peter, three ounces; Oyl of bitter Almonds, two pound; of Squils, half a pound; one Lemmon without the Pills: mingle them, and let them ferment three days: then, with Chymical Instruments, extract the Oyl, and anoynt your Tetters therewith, and they will be gone, though they seem to turn to a Leprosie.

CHAP. XXIII.

How Warts may be taken away.

WArts use to possess the Fore-head, Nose, Hands, and other open places: so doth hard Flesh, and other foulness of the skin: women cannot endure them. I found out Remedies against these deformities of the skin.

Against Warts.

The Ancients used the greater Spurge, whose juice, anoynted on with Salt, takes them away: and therefore they called it Warts-Herb. There is also a kinde of Succony, called Verrucaria from the effect: for if one eat it but once in Sallets, all the Warts will be gone from any part of the Body: or, if you swallow one drachm of the Seeds.

Another.

This one, and so no more. There is a kinde of Beetle that is Oyly, in Summer you shall finde it in Dust and Sand in the way; if you rub that on the Warts, they will be presently gone, and not be seen. You may finde these, and keep them for your use.

CHAP. XXIV.

To take away wrinkles from the Body.

MAny parts of the Body use to be wrinckled, as the Hands, Face, Belly after Child-bearing; and the like. To contract the Skin therefore do thus:

For a wrinckled Forehead.

the

the Dregs of Linseed-Oyl is good : or Lees of Oyl of Olives ; putting unto it a little Gum-Arabick, Traganth, Mastick and Champhire : it is good also for flagging Brests.

For a wrinkled Face.

When Eggs are boyled hard in water, cut them in the middle, fill the holes where the yelks were, with Powder of Myrrh : then cover one with the other half, and binde them with a Thread, that they come not asunder: then take a glazed earthen Vessel, with a broad mouth, and lay sticks across it, that the Eggs may lie upon them hanging neer the bottom: let the cleft of the Eggs hang toward the bottom: put the earthen Vessel into a chest of Osiers, and set it in a Well ; let it hang one foot from the water ; by the moysture whereof, the Myrrh will dissolve into Oyl of water : anoynt your Face with it. The juice of the green Canes of the Pine-Tree, but it is weaker then the distilled water, being applied to the Face, with a Linnen-cloth wet therein, will take away all wrinkles from the Face excellently well. You have

Another.

Steep Kidney-Beans in Malmsey, one day ; then take away the black whence they sprout, and distil them with Lemmons and Honey. Take a quantity of old Cow-Beef, and distil that also ; mingle the waters, and set them in the open Air, in a Glass-Vessel in the Sun for fifteen days, and wash your Face morning and evening therewith.

Another.

Crop in the morning the Flowers of Mullens, and steep them in Greek-Wine, with the Roots of *Solomons*-Seal : then receive the water distilled in Glass-stills : and if a woman, when she riseth out of her bed, wash her face with this, she will be very fair : and if you would take off the wrinkles with the same water, add distilled water of Lemmons thereunto, and it will make you glad to see the effect. But this is the best

Water to whiten, plain, and beautifie the Face.

Take equal parts of the Root of *Solomons* Seal, greater Dragons and lesser, Sparagrass, Bryony, and white Lillies, as much as you please : bruise them a little, and cast them into an earthen pot with a large mouth ; let it be glazed : pour on Greek Wine that may cover all : add to these juice of Lemmons, a fourth part, ten new Eggs bruised with their shells, and Land-Snails without shells; let them infuse a while: then distil them at a gentle fire, and keep the first water a part : then augment the fire, and keep the second ; that will be stronger : for this wipes all spots and red pimples from the Face. Some mingle with this, water of Bean-Flowers, Elder, Poppy, Honey-Suckles, and the like ; so do they take away all wrinkles and spots coming from the Sun, and all the rest. But you may thus take off

The wrinkles of the Belly after child-birth.

Unripe Services are long boyled in water: with these mingle whites of Eggs, and water wherein Gum-Arabick is dissolved : wet a Linen-cloth in such water, and lay on the Belly ; or mingle the Powders of Harts Horn burnt, the Stone Amiantus, Salt-Ammoniac, Myrrh, Frankincense, Mastick, with Honey ; and it takes away all wrinkles.

Chap. XXV.
Of Dentifrices.

Dentifrices are used amongst things to beautifie women: for there is nothing held more ugly then for a woman to laugh or speak, and thereby to shew their

rugged, rusty, and spotted Teeth: for they all almost, by using Mercury sublimate, have their Teeth black or yellow: and because they stand in the Sun when they would make their Hair yellow, their Teeth are hurt thereby, and grow loose, ready to fall out; and do oft-times. I shall shew first how to make black Teeth white as Pearls; then how to make flesh grow about such as are weak and bare of Gums, and to make them strong. But of old were made

Dentifrices

of the shells of Purples, and others like trumpets burnt. The Arabian-stone it is like the spotted Ivory; burned, it is good for Dentifrices. Also, of Pumex-Stone very profitable Dentifrices were made. *Pliny*. So with the Powder of Ivory rubbed on, the Teeth were made as white as Ivory. *Ovid*.

That Teeth may not grow black forborn,
With Fountain-water wash them every morn.

I shall add

Another

that I use. The Crums of Barley-Bread burnt with Salt sprinkled on, and Honey, will not onely make the Teeth white, but makes the Breath sweet. Also, with red Coral, Cuttle-bone, Harts Horn, and such-like, whereof every one will well polish and wipe the Teeth clean: so doth also the Grains of Cochinele. Also, there is made a water of Allom and Salt distilled, that whiteneth the Teeth exceedingly, and confirms them; but the Oyl of Sulphur doth it best: for it smooths them and wipes away all spots: and if any one think it is too strong, it may be qualified with the water of Myrtle flowers. Make a Tooth-scraper after the fashion of a Tooth, and pour on Oyl, and rub the spots therewith: but be careful it touch not the Gums, for it will whiten and burn them: rub so long till the spots be gone, and they be very white. I have now described the most perfect Remedy.

CHAP. XXVI.

To hinder the brests from augmenting.

AMongst the Ornaments of women, this is the chief, to have after Child-bearing, round, small, solid, and not flagging or wrinkled Brests. So we may

Hinder the augmenting of the Brests,

if we will. Bruise Hemlock, and lay a Cataplasm thereof with Vinegar to womens Brests, and it will stay them that they shall not increase; especially, in Virgins: yet this will hinder milk, when it should be seasonable. But if you will

Curb soft and loose Brests,

Powder white Earth, the white of an Egg, sowre Galls, Mastick, Frankincense; and mingle them in hot Vinegar, and smeer the Brests therewith: let it stay on all night. If it do not effect it, do the same again. The Stones of Medlars are good for this also; unripe Services, Sloes, Acacia, Pomegranate Pills, Balanstia, unripe Pine-nuts, Wilde Pears, and Plantain; if they all boil in Vinegar, and be laid to the Brests, or some of them. The Antients commended for this purpose a Whetstone of Cypress, that we sharpen Iron upon, to restrain Virgins Brests, and not let them grow big. *Dioscorides*. But *Galen* saith, That it not onely stops the encrease of the Brests, but will hinder childrens Testicles from growing: but I use the juice of Ladies Mantle from the Leaves of it, and I wet Linen in it, and lay it on the Brests, and renew it; for it will not onely hinder Virgins Brests from increasing, but will fasten the loose Brests of Matrons, and make them firm. It is more effectual to use the decoction of the Herb; and if you joyn any of the forementioned things

therewith, as Hypociftis, Pills of Pomegranates, and the like. So water distilled from green Pine-Apples, will draw in loose Brests, and make them like the round, hard, solid Brests of Virgins.

Chap. XXVII.

How the Hand may be made white.

THe Hands must not be forgotten, but we must make them white also, smooth, and soft, that are Ornaments of the Hands to be desired. But how whiteness and smoothness may be obtained, I have shewed already; softness remains, which is onely given to fat Hands.

To make the Hands as white as Milk.

Take things that are Milk-White, as Almonds, Pine-Kernels, Melon and Gourd-Seeds, and the like. Therefore bruise bitter Almonds, Pine-Kernels, and Crums of Bread: then make Cakes of them with Barley-water, wherein Gum Traganth hath been soaked. You may use this for Sope, when you wash your Hands; for they scowre them, and make them white. I

For the same,

use oft-times bitter Almonds, half a pound: put them in hot water to blanch them: then beat them in a Marble-Morter. Afterwards, take the lesser Dragons, two ounces; Deers Suet and Honey, of each as much: mingle them all in an earthen Pot with a large mouth: set them at the fire, and let them be stirred gently with a wooden-stick that they mingle well: put it up in Boxes for your use. If you will have

Your hands white,

wash fresh Butter nine times in sweet water, and last of all, in sweet-sented Rose-water, to take off the ill smell; and that it may look as white as Snow, then mingle white wax with it, and a good quantity of Oyl of sweet Almonds. Then wash your gloves in Greek-Wine, as the manner is, and smeer on the foresaid mixture: put on these when you go to bed, that all night they may grow soft by the help of fat things. Then take Peach-Kernels, with the skins picked off, Seeds of Gourds, Melons white Poppy, Barley-meal, of each one ounce and half; the juice of two Lemmons, rosted in the Embers: mingle these with as much Honey as will make them thick as an Oyntment: and to make them smell well, you may add a little Musk or Civet, when you go to bed; but in the morning wash them with Fountain-water: and for Sope, use the Lees of Oyl of Nuts well pressed forth, or Lees of Oyl Olive. Others use this Liniment onely. Press the Cream out of Lemmon-Seeds; with two ounces of it, mingle one ounce of Oyl of Tartar, and as much Oyl of Almonds. When at night you go to bed, wash your Hands in Fountain-water; dry them, and anoynt them with this Liniment, and put on your Gloves. Take

Another.

For one weeks-time, infuse the Marrow of Ox-bones in cold water; but change the water four or five times a day; and for every pound of Marrow, take six excellent Apples, and cut them in the middle, and cast forth the Seeds and Core: then beat them small in a Marble-Morter, and put them into a new Morter, that they may smell the sweeter: adding a few Cloves, Cinnamon, Spikenard; let them boyl in Rose-water. When they are all very soft, take them forth and strain them, and again add a sharp Lixivium, and let them boyl at a gentle fire, until all the water be washed. Then set them up in a Glass-Vessel for your use, or make them into morsels. That which follows is good

For the same.

Make a hole in a Lemmon, and put into it Sugar-Candy and Butter, and cover it with

with the Cover: wet Hards of Hemp, and wrap it up in, and boyl it in hot Embers, and that it grow soft by rosting: when you go to Bed, anoynt your hands with it, and put on your Gloves.

CHAP. XXVIII.
How to correct the ill sent of the Arm-pits.

THe stink of the Arm-holes makes some women very hateful; especially, those that are fat and fleshy. To cure this, we may use such kinde of Experiments. The Ancients against the stink of the Arm-pits, used liquid Allome with Myrrh to anoynt them: or the Secrets and Arm-holes were strewed with the dry Leaves of Myrtles in powder. The Roots of Artichoaks smeered on, doth not onely cure the ill sent of the Arm-pits, but of the whole Body also. But *Zenocrates* promiseth by Experiment, That the faultiness of the Arm-pits will pass forth by urine; if you take one ounce of the pith of the Root boyled in three Lemina's of Muskadel to thirds; and after bathing, fasting, or after meat, drink a cup thereof. But I am content with this. I dissolve Allome in water, and I wash the Feet and Arm-pits with it, and let them dry: so in some days we shall correct the strong smell of those parts. But it will be done more effectually thus. Pown Lytharge of Gold or Silver, and boyl it in Vinegar; and if you wash those parts well with it, you shall keep them a long time sweet: and it is a Remedy, that there is none better.

CHAP. XXIX.
How the Matrix over-widened in Child-birth, may be made narrower.

T*Rotula* saith, we may honestly speak of this, because Conception is sometimes hindred by it, if the Matrix be too open; and therefore it is fit to lend help for such an impedient. For some women have it stand wide-open by reason of their hard labour in Child-birth; and if their Husbands be not content with it, that the men may not abhor the women, it is thus remedied. Take Dragons Blood, Bole-Armeniac, Pomegranate-shells, white of an Egg, Mastick, Galls, of each one ounce: powder them, and make them all up with hot water. Put some of this Confection into the hole that goes into the Matrix. Or, Galls, Sumach, Plantain, great Comfrey, Allome, Chamælæa; take equal parts of them all, and boyl them in Rain-water, and foment the Privities. Or, beat sowre Galls very finely: mingle a little of the Powder of Cloves with them. Let them boyl in sharp red Wine: wet a woollen cloth in it, and apply to the part. Or thus may you restrain that part of common whores, with Galls, Gums, whites of Eggs, Dragons Blood, Acacia, Plantain, Hypocistis, Balanstia, Mastick, Cypress-nuts, Grape-skins, Akorn-cups. Or, in that hollow part where the Glans breaks forth; and gaping, shews the Nucleus, with Mastick and Terra Lemnia. If all these be boyled in red Wine or Vinegar, and the Matrix be often wet therewith, it will come very close, and be much straighter. Or else powder all these, and cast them in through a Reed, or make a fume under them Great Comfrey will be excellent for this purpose: for flesh boyl'd with it, will grow together. And the other also, if it be boyl'd, will very well glew together fresh Wounds. The Decoction of Ladies Mantle, or the juice, or distilled water of it, cast into the Matrix, will so contract it, that Whores can scarce be known from Maids: or, if they sit in the Decoction of it; especially, if we mingle other astringent things with it, and wet the Secrets therewith. The distilled water of Starwort, being often injected into the Matrix, will make one scarce know which is corrupted, and which is not. But if you will have

A woman deflowred made a virgin again,

Make little Pills thus: Of burnt Allome, Mastick, with a little Vitriol and Orpiment: make them into very fine Powder, that you can scarce feel them: when you have

have made them Pills with Rain-water, press them close with your fingers; and let them dry, being pressed thin, and lay them on the Mouth of the Matrix, where it was first broken open: change it every six hours, always fomenting the place with Rain or Cistern-water, and that for twenty four hours, and it will here and there make little Bladders; which being touched, will bleed much blood, that she can hardly be known from a Maid. Midwives that take care of this, do it another way. They contract the place with the Decoction of the forementioned things, then they set a Leech fast on upon the place, and so they make a crusty matter or scab; which being rub'd will bleed. Others when they have straightned the part, inject the dried Blood of a Hare or Pigeon; which being moistned by the moysture of the Matrix, shews like live fresh Blood. I found out this noble way: I powder Litharge very finely, and boyl it in Vinegar, till the Vinegar be thick; I strain out that, and put in more, till that be coloured also: then I exhale the Vinegar at an easie fire, and resolve it into smoak.

Chap. XXX.

Some sports against women.

Thus far I have shewed how to beautifie women, now I shall attempt some things against their decking of themselves, and make some merriment after those things that I seriously discovered to adorn them.

To make a painted Face look pale.

If you would know a painted Face, do thus: Chew Saffron between you Teeth, and stand neer to a woman with your mouth: when you talk with her, your breath will foul her Face, and make it yellowish; but if she be not painted, the natural colour will continue. Or burn Brimstone in the room where she is: for if there be Cerus or Mercury sublimate on her Face, the smoak will make her brown, or black. The painted Women that walk at Puteoli, in the Mountains of Phlegra, are made so black, as Silver-money is, shut up in bags. We may also know thus,

Whether she be painted with red.

Chew Grains of Cummin, or a Clove of Garlick, and speak close by her; if it be natural, it will remain; but counterfeit with Ceruss or Quick-silver, it presently decays.

To make a woman full of red pimples.

Of a Stellio is made an ill Medicament: for when he is dead in Wine, all the Faces of those that drink of it, will be red-spotted. Wherefore, they that would disfigure Whores, kill him in an Oyntment. The Remedy is, the yelk of an Egg, Honey and Glass. *Pliny.*

To make the Face green.

Avicenna saith, That the Decoction of Chamæleon, put into a bath, will make him green-coloured that stays long in that bath; and then by degrees he will recover his former colour.

To make the Hair fall off the Head and Beard.

Touch any part of mans body with a matter white as milk, that the Salamander vomits up out of its mouth, and the Hairs will fall off; and what is touched is changed into the Leprosie. *Pliny.*

THE

THE
TENTH BOOK
OF
Natural Magick:
Of Distillation.

The Proeme.

NOw I am come to the Arts, and I shall begin from Distillation, an Invention of later times, a wonderful thing, to be praised beyond the power of man; not that which the vulgar and unskilful men use: for they do but corrupt and destroy what is good: but that which is done by skilful Artists. This admirable Art, teacheth how to make Spirits, and sublime gross Bodies; and how to condense, and make Spirits become gross Bodies: and to draw forth of Plants, Minerals, Stones and Jewels, the Strength of them, that are involved and overwhelmed with great bulk, lying hid, as it were, in their Chests: and to make them more pure, and thin, and more noble, as not being content with their common condition, and to lift them up as high as Heaven. We can by Chymical Instruments, search out the Vertues of Plants, and better then the Ancients could do by tasting them. What therefore could be thought on that is greater? It is Natures part to produce things, and give them faculties; but Art may ennoble them when they are produced, and give them many several qualities. Let one that loves Learning, and to search Natures Secrets, enter upon this: for a dull Fellow will never attain to this Art of Distilling. First, we shall extract Waters and Oyls: then, the Essences, Tinctures, Elixirs, Salts, and such-like: then we shall shew how to resolve mix'd Bodies into the Elements, and make them all more pure, to separate their divers and contrary qualities, and draw them forth, that we may use them at pleasure: and other things, that will never repent us to know and do.

Chap. I.
What Distillation is, and of how many sorts.

WHether the Art of Distillation were known to the Learned Ancients, or no, I will not undertake to dispute; yet there is another kinde of Art to be read in *Dioscorides*, then what we use. He saith thus: There is an Oyl extracted out of Pitch, by separating the watry part, which swimmeth on the top, like Whey in Milk: and hanging clean flocks of Wool, in the vapor arising from it while the Pitch boyls; and when they are moyst, squeezing them into some Vessel. This must be done as long as it boyleth. *Geber* defineth it thus: Distillation is the Elevation of moist vapors in a proper Vessel: but we will declare the true definition of it elsewhere. He maketh three sorts of it; by Ascent, by Descent, and by Filtration. But I cannot but confess, that Filtration is not properly a species of Distillation. But I say, by Ascent, by Descent, and by Inclination, which is a middle between both, and is very necessary: for when a thing is unwilling to ascend, we teach it by this to rise by degrees, by inclining the Vessel; and raise it by little and little, until it become thinner, and know how to ascend. The Instructions for Distillation shall be these: First, Provide a Glass or Brazen Vessel, with a Belly swelling out like a Cupping-Glass, and sharpened upward like a Top or a Pear: fit

it

it to the under-Vessel like a Cap; so that the neck of that lower Vessel may come into the belly of the upper. A Pipe must run about the Bottom of the Cap, which must send forth a Beak; under which, there must stand another Vessel, called the Receiver, from receiving the distilling water. Stop all the vents close with Staw-mortar, or rags of Linen, that the spirituous Aery matter may not pass out. The fire being put under this Stillatory, the inclosed matter will be dissolved by the heat of the fire into a dewy vapor, and ascendeth to the top; where, meeting with the cold sides of the Head, it sticketh there; being condensed by the cold, swelleth into little bubbles, bedeweth the roof and sides, then gathereth into moyst pearls, runneth down in drops, turneth into water, and by the Pipe and Nose is conveyed into the Receiver. But both the Vessels and the Receiver must be considered, according to the Nature of the things to be distilled. For if they be of a flatulent vaporous Nature, they will require large and low Vessels, and a more capacious Receiver: for when the Heat shall have raised up the flatulent matter, and that finde it self straitned in the narrow cavities, it will seek some other vent, and so tear the Vessels in pieces, (which will flie about with a great bounce and crack, not without endamaging the standers by) and being at liberty, will save it self from further harm. But if the things be hot and thin, you must have Vessels with a long and small neck. Things of a middle temper, require Vessels of a middle size: All which the industrious Artificer may easily learn by the imitation of Nature, who hath given angry and furious Creatures, as the Lion and Bear, thick bodies, but short necks; to shew, that flatulent humours would pass out of Vessels of a larger bulk, and the thicker part settle to the bottom: but then, the Stag, the Estrich, the Camil-Panther, gentle Creatures, and of thin Spirits, have slender bodies and long necks; to shew that thin, subtile Spirits, must be drawn through a much longer and narrower passage, and be elevated higher to purifie them. There is one thing which I must especially inform you of, which is, that there may be a threefold moysture extracted out of Plants: The Nutritive, whereby they live, and all dried Herbs want; it differeth little from Fountain or Ditch-water: The Substantial, whereby the parts are joyned together; and this is of a more solid Nature: And the third is the Radical humor, fat and oyly, wherein the strength and vertue lieth. There is another thing, which I cannot pass over in silence, it being one of the Principles of the Art, which I have observed in divers Experiments; which is, that some mixt bodies do exhale thin and hot vapors first, and afterwards moyst and thick: on the contrary, others exhale earthy and phlegmatick parts first, and then the hot and fiery; which being fixed in the inmost parts, are expelled at last by the force of the fire. But because there can be no constant and certain Rule given for them, some I will mark unto you; others, your own more quick ingenuity must take the pains to observe.

Chap. II.

Of the Extraction of Waters.

THe Extraction of Waters, because it is common, I will dispatch in a few words. If you would extract sweet Waters out of hot Plants, and such as are earthy, and retain a sweet savour in their very substance; these being cast into a Stillatory, without any Art, and a fire made under them, yield their odors: as you may draw sweet Waters out of

Roses, Orange-flowers, Myrtle and Lavender, and such-like,

either with Cinders, or in Balneo Mariæ; but onely, observe to kindle the fire by degrees, lest they burn. There are also in some Plants, sweet Leaves, as in Myrtle, Lavender, Citron, and such-like; which, if you mix with the Flowers, will no way hinder the savour of them, but add a pleasantness to the Waters: and in places where Flowers cannot be gotten, I have seen very sweet Waters extracted out of the Tendrils of them: especially, when they have been set abroad a sunning in a close Vessel for some dayes before. There is a Water, of no contemptible sent, drawn

drawn out of the Leaves of Basil gentle, (especially, being aromatized with Citron or Cloves) by the heat of a gentle Bath, heightened by degrees, and then exposing it to the Sun for some time. There is an odoriferous Water extracted out of the Flowers of Azadaret, or bastard Sicamore, very thin and full of savor. The way to finde out whether the odor be settled in the substance of a Plant, or else in the superficies or outward parts, is this: Rub the Leaves of Flowers with your fingers; if they retain the same sent, or cast a more fragrant breath, then the odour lieth in the whole substance. But on the contrary, if after your rubbing, they do not onely lose their natural sent, but begin to stink, it sheweth that their odour resideth onely in their superficies, which being mixed with other ill savoured parts, are not onely abated, but become imperceptible. In distilling of these, we must use another Art. As for example,

To extract sweet Water out of Gillflowers, Musk, Roses, Violets, and Jasmine, and Lillies.

First draw the juice out of some wilde Musk Roses, with a gentle heat in Balneo; then remove them, and add others: for if you let them stand too long, the sent which resideth in the superficies is not onely consumed, but the dull stinking vapour which lieth in the inward parts is drawn forth. In this water, let other Roses be infused for some hours, and then taken out and fresh put in, which the oftner you do, the sweeter it will smell: but stop the Vessel close, lest the thin sent flie out and be dispersed in the Air; and so you will have a most odoriferous Water of Musk-Roses. The same I advise to be done with Jasmine, Gillflowers, Lillies, and Violets, and Crows-toes, and the like. But if you are not willing to macerate them in their own waters, the same may be done in Rose-water. By this Art, I have made Waters out of Flowers of a most fragrant smell, to the admiration of Artists of no small account. But because it happeneth sometimes by the negligence of the Operator, that it is infected with a stink of burning, I will teach you

How to correct the stink of burning.

Because that part which lieth at the bottom feeleth more heat then the top, whence it cometh to pass, that before the one be warm, the other is burnt, and oftentimes stinketh of the fire, and offendeth the nose; Therefore distil your Waters in Balneo with a gentle fire, that the pure clear Water may ascend, and the dregs settle in the bottom with the Oyl, a great cause of the ill savour.

How to draw a great quantity of Water by Distillation.

Fasten some Plates of Iron or Tin round the top of the Stillatory; set them upright, and let them be of the same height with it, and in the bottom fasten a Spigget. When the Stillatory waxeth hot, and the elevated vapors are gathered into the Cap, if that be hot, they fall down again into the bottom, and are hardly condensed into drops: but if it be cold, it presently turneth them into Water. Therefore pour cold Water between those plates, which by condensing the vapours, may drive down larger currents into the Receiver. When the Cap, and the Water upon it begin to be hot, pull out the Spigget, that the hot Water may run out, and fresh cold Water be put in. Thus the Water being often changed, that it may always be cold, and the warm drawn out by the Spigget, you will much augment the quantity of your Water.

CHAP. III.

Of extracting Aqua Vitæ.

IT is thus done: Take strong rich Wine growing in dry places, as on Viseuvius, commonly called Greek-wine, or the tears or first running of the Grape. Distil this in a Glass-Retort with Cinders, or in Balneo, or else in a long necked Still. Draw out the third part of it, and reserve the rest; for it is turned into a perfect sharp

sharp Vinegar; there remaining onely the carcase of the Wine: for the life and tenuous part is taken out. Then distil the same again, and the third time; alwayes drawing off but a third part. Then prepare a Vessel with a longer and straighter neck, of three cubits, and distil it again in this: at last, put it into the mouth of the Vessel, cover it with Parchment, and set on the Cap of the Stillatory, and kindle the fire: the thin spirits of the Wine, will pass through all, and fall down into the Receiver; and the phlegm, which cannot get passage, will settle to the bottom. The note of perfect depuration from phlegm, will be, if a rag being dipt in it, and set on fire, do burn quite away: or, if some of it, being dropt on a plain board, be kindled into flame, doth leave no moysture or mark of it. But all the work dependeth on this, that the mouth of the Vessel be exactly stopped and closed; so that the least Spirit may not finde vent and flie into Air. The fittest thing to stop them with, is an Ox's Bladder, or some other Beasts; for being cut into broad fillets, and while they be wet, rolled and tied about where the mouths of the Vessels meet; it will alone keep in the expiring vapors. You may observe this in the Distillation of it. The Coals being hot, the Vessel boyleth, and a most burning Spirit of the Wine, ascendeth through the neck of the Vessel: it is hot below, and cold on the top, till it getteth up into the Cap, then, encountring with cold, it turneth into water, and runneth down by the nose into the Receiver: and what was a long time ascending, then, in a small interval of time, flows down again to the under-placed Glass. Then, the Cap being cold, sendeth down that quality through the neck into the very belly of the Stillatory, until the Spirit, being separated from the phlegm, worketh the same effect again. I use to suffer the Wine to ascend, so long as the Spirit runneth invisible into the Receiver: for when the phlegm ascendeth, there will appear bubbles in the Cap, and streams, which will run into the water through the nose. Then I take away that dead carcase of the Wine, and pour in fresh VVine, and extract the Spirit out of that the same way.

To do the same a more compendious way.

Those who desire to do this in a shorter time, must make a Brass Vessel, of the bigness of an ordinary Barrel, in the form of a Gourd; but the nose of the Cap must be made of Glass, or Brass of fifteen or twenty foot, winding about with circling Revolutions, or mutual crossings, or as it were with the circling of Snakes, which they must set in wooden Vessels, full of cold water, that passing through, it may be received into the Receiver. For when it hath distilled the third part of the VVine in three hours, they must cast out the residue, and put that which is distilled into the Stillatory again; and the second time distill out a third part: so also the third time in the same day. At length, they put it into a Stillatory with a longer neck, and separate the phlegm from it, Some make the Cap with three or four heads, setting one upon another, all being pervious but the uppermost; and every one having his nose, and his particular Receiver. They fit them to the Vessel with a long neck, set them on, binde them and lute them, that they have no vent: the water which distilleth out of the uppermost head, is cleerest and most perfect: that out of the lowest, more imperfect, and must be reserved asunder; for they will be of different estimation: the highest will be cleere from all phlegm, the lower full of it, the middle in a mean between both.

How to make Aqua Vitæ *of new Wine.*

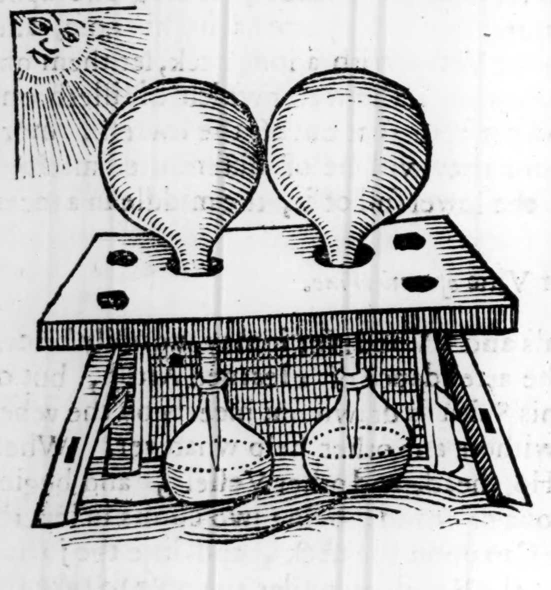
It may be done without the charge of Coals and VVood: for it may worthily be called ἀπυρεῖ αὐτόι, neither doth it require the attendance of a learned Artist, but of an ignorant Clown, or a woman: for this Spirit is drawn out meerly by the vehement working of Nature, to free her self without any other help whatever. When the VVine is run out of the press into the Hogshead, and other Vessels, and beginneth to purge, place an earthen neck, or one of wood, being two cubits in length, upon the bung-hole of the Vessel: set the Cap upon the neck, and lute the joynts very close, that there may be no vent: set the Receiver under the nose to take the Water which floweth down. Thus thine exhalations being elevated by the working

Spirits of the Wine, are converted into Water, meerly for the work of Nature, without the help of fire, which therefore hath his particular vertues, which we will pass over now, and mention them in another place.

CHAP IV.

How to distil with the heat of the Sun.

WE may distil not onely with fire, but with the Sun and Dung. But the last tainteth the distilled Waters with a scurvy sent. The Sun extracteth the best Water, and very useful for many Medicines. The heat of the fire changeth the Nature of things, and causeth hot and fiery qualities in them. Wherefore in all Medicines for the eyes, we must use Waters extracted from the Sun: for others do fret and corrode the eye, these are more gentle and soft. The Sun extracteth more Water then the fire, because the vapours do presently condense and drop down; which they do not over the fire, because they are driven up with a force, and stick to the sides of the Stillatory, and fall down again into the bottom. There are other advantages which shall be explicated in their proper places. Besides, it is good Husbandry: for the work is done without wood, or coals, or labour. It is but filling the Vessels with the Ingredients, and setting them in the Sun, and all the pains is past. Therefore to explain the manner in a few words: Prepare a Form of three foot in height, two in breadth, and of a length proportionable to the number of the Vessels you intend to set to work: if many, make it longer; if a few, let it be shorter. Board up that side of the Form next the Sun, lest the heat do warm the Receivers, and make the Water ascend again. In the middle of the upper plank of the Form, make several holes for the necks of the Glasses to pass down through. When the Sun hath passed Gemini, (for this must be performed in the heat of Summer only) set your form abroad in the Sun. Gather your Herbs before Sun-rise, pick them and cleanse them from dust and durt of mens feet, from the urine and ordure of Worms and other Creatures, and such kind of filth and pollutions. Then, lest they should foul and soil the Water, shake them, and wipe them with clothes; and lastly, wash your hands, and then, them, and dry them in the shade: when they are dried, put them into the Glasses, take some wire-Cittern strings, and winde them into round clues; so that being let go, they may untwine themselves again: put one of these, into the mouth of each Glass, to hinder the Herbs from falling out, when the Glasses are turned downwards. Then thurst the necks through the holes of the Form into the Receivers, which are placed underneath, and admit them into their bellies: fasten them together with linen bands, that there may be no vent: and place the Receivers in dishes of water, that the vapor may the sooner be condensed. All things being thus provided, expose them to most violent heat of Sun-beams; they will presently dissolve them into vapors, and slide down into the Receivers. In the evening, after Sun-set, remove them, and fill them with fresh Herbs. The Herb Polygonum, or Sparrows-tongue, bruised, and thus distilled, is excellent for the inflammation of the eyes, and other diseases. Out of S. *Johns*-wort, is drawn a water good against cramps, if you wash the part affected with it: and others also there are, too long to rehearse. The manner of Distilling, this Figure expresseth.



CHAP.

Chap. V.

How to draw Oyl by Expression.

WE have treated of Waters, now we will speak of Oyls, and next of Essences. These require the industry of a most ingenious Artificer: for many the most excellent Essences of things, do remain in the Oyl, as in the radical moysture, so close, that without the greatest Art, wit, cunning, and pains, they cannot be brought to light: so that the whole Art of Distillation dependeth on this. The cheifest means is by Expression; which, though it be different from the Art of Distillation, yet because it is very necessary to it, it will not be unnecessary to mention here. The general way of it, is this: Take the Seeds out of which you would draw Oyl, blanch them, and strip them of their upper Coats, either by rubbing them with your hands, or picking them off with your nails. When they are cleansed, cast them into a Marble-Morter, and beat them with a wooden Pestle: then sprinkle them with Wine, and change them into a Leaden-Morter: set them on the fire, and stir them with a wooden-Spoon. When they begin to yield forth a little Oyliness, take them from the fire, and prepare in readiness two plates of Iron of a fingers thickness, and a foot-square: let them be smooth and plain on one side, and heated so, that you can scarce lay your finger on them; or, if you had rather, that they may hiss a little when water is cast upon them, wrap the Almonds in a linen-cloth being wetted, squeeze them between these plates in a press: save the Expression, and then sprinkle more Wine on the pressed Almonds or Seeds: allow them some time to inbibe it: then set them on the fire, stir them, and squeeze them again, as before, until all their Oyl be drawn out. Others put the Seeds when they are bruised and warmed, into a bag that will not let the Oyl strain thorow; and by twining two sticks about, press them very hard and close: then they draw the Oyl out of them, when they are a little settled.

To draw Oyl out of Nutmegs.

Beat the Nutmegs very carefully in a Morter, put them into a Skillet, and warm them, and then press out the Oyl which will presently congeal. Wherefore, to make it fluide and apter to penetrate, distil it five or six times in a Retort, and it will be as you desire: or else, cast some burning Sand into it, and mix it, and make it into Rolls; which, being put into the neck of a Retort, and a fire kindled, will the first time remain liquid.

To extract Oyl out of Citron-seed

we must use the same means. Blanch and cleanse them: an Oyl of a Gold-colour will flow out: they yield a fourth part; and it is powerful Antidote against Poyson and Witchcraft; and it is the best Menstruum to extract the sent out of Musk, Civet and Amber, and to make sweet Oyntments of, because it not quickly grow rank.

Oyl of Poppy-Seed

is extracted the same way, and yields a third part of a Golden-colour, and useful in dormitive Medicines. Also, thus is made

Oyl of Coloquintida-Seeds.

The fairest yield a sixth part of a Golden-colour: it killeth Worms, and expelleth them from Children, being rubbed on the mouth of their Stomach. Also,

Oyl of Nettle-Seed.

An ounce and a half may be extracted out of a pound and a half of Seeds, being picked and blanched: it is very good to dye womens Hair of a Gold-colour.

is made by another Art. Take fifty or sixty Eggs; boyl them till they be hard: then peal them, and take out the yelk, and set them over warm Coals in a tinned Posnet, till all their moysture be consumod; still stirring them with a wooden-spattle: then encrease the fire, but stir them uncessantly lest they burn. You will see the Oyl swet out, when it is all come forth, take away the fire, and skim off the Oyl. Or, when the Oyl beginneth to swet out, as I said, put the Eggs into a press, and squeeze them very hard: they will yield more Oyl, but not so good.

CHAP. VI.

How to extract Oyl with Water.

NOw I will declare how to extract Oyl without Expression: and first, out of Spices, Seeds, Leaves, Sticks, or any thing else. Oyl being to be drawn out onely by the violence of fire, and very unapt to ascend, because it is dense: considering also, That Aromatick Seeds are very subtile and delicate: so that if they be used too roughly in the fire, they will stink of smoak, and burning: therefore, that they may endure a stronger fire, and be secure from burning, we must take the assistance of water. Those kinde of Seeds, as I said, are endued with an Airy, thin, volatile Essence; and by the propriety of their Nature, elevated on high; so, that in Distillation, they are easily carried upward, accompanied with water; and being condensed in the Cap of the Stillatory, the oyly and the waterish vapours, run down together into the Receiver. Chuse your Seeds of a full ripeness; neither too new, nor too old; but of a mature age: beat them and macerate them in four times their weight of water; or so, that the water may arise the breadth of four fingers above them: then put them into a Brass-pot, that they may endure the greater fire; and kindle your Coals unto a vehement heat, that the Water and Oyl may promiscuously ascend and flow down: separate the Oyl from the Water, as you may easily do. As for example,

How to draw Oyl out of Cinnamon.

If you first distil Fountain water twice or thrice, you may extract a greater quantity of Oyl with it: for being made more subtile, and apt to penetrate, it pierceth the Cinnamon, and draweth the Oyl more forcibly out of its Retirements. Therefore take CXXXV pound of Fountain-water, distil it in a Glass-Alembick: when forty pound is drawn, distil that until fifteen flow out: then cast away the rest, and draw five out of those fifteen. This being done, macerate one pound of Cinnamon in five of Water, and distil them in a Retort or Alembick. First, a Milky water will flow out with Oyl, next cleer Water: cast the Water in over the Oyl, and separate them as we shall teach you. Of a pound of Cinnamon, you will scarce receive a drachm of Oyl.

How to draw a greater quantity of Oyl out of Cinnamon.

I do use to do it in this manner, to the wonder of the best and subtillest Artists: Provide a Descendatory out of the Bath, (the making of which, I will shew hereafter) and put your Cinnamon, being grosly beaten into a Glass-Retort: set it in its proper place, and put water into the Bath; the heat of the fire by degrees, will draw a little water in many days: receive it careful, and pour it again into the Cinnamon that it may re-imbibe its own water; so let it remain a while: afterwards, kindle the fire, and you shall receive a little Water and Oyl. Do this third and fourth time, and you will gain an incredible quanity. You may try the same in other things.

Oyl of Cloves

may be extracted in the same manner: To every pound of Cloves, you must add ten of Water; distil them as before: so shall you have both Water and Oyl. It will yield a twelfth part. The Oyl is good for Medicines, and the VVater for Sawces. So also is made

Li-

Liquid Oyl of Nutmegs.

If you bruise them, and put them with the VVater into a Vessel, and distil them as before, they will yield a sixth part.

Oyl of Mace and Pepper

is drawn in the same manner, much stronger, but in less quantity.

Oyl of Aniseed

may be thus extracted; an ounce out of a pound. It congealeth in VVinter like Camphire or Snow: in the Summer it dissolveth. Let the Seeds be macerated in the VVater for ten days at least: for the longer they lie there, the more Oyl they will yield.

Oyl of Fennel

is extracted in the same quantity: when the Seeds are ripe and fresh, they have most Oyl; for they yield as much more.

Oyl of Coriander

yieldeth but a small quantity, and is of very hard extraction: there is scarce one drachm drawn out of a pound: new Seeds yield most. And to be short; in the same manner are extracted the Oyls out of the Seeds of Carrot, Angelica, Marjoram, Rue, Rosemary, Parsely, Smallage and Dill, and such-like.

Oyl of Rosemary and Lavender-flowers, and

such-others, which being dried, afford no Oyl, may be thus extracted: Put the Flowers into a Receiver, and set it close stopt in the hot Sun for a month: there will they dissolve into Liquor, and flie up to the sides of the Glass: then being condensed again, fall down and macerate in themselves: at a fit time, add VVater to them and distil them, as the former: so shall you draw forth with the VVater a most excellent sweet Oyl.

Oyl of Juniper and Cypress-Wood

may de drawn out by the same Art, if you macerate the dust of them in their own or in Fountain-water for a month, and distil them in the same manner: the Oyl will come out by drops with the water, of a strong sent, and excellent vertue. These I have tried, the rest I leave to thee.

Chap. VII.

How to separate Oyl from Water.

VVHen we extract Oyls, they run down into the Receiver together with the VVater: wherefore they must be separated, lest the flegm, being mixed with the Oyl do weaken the vertue of it: that it may obtain its full vigour, it must be purified by Distillation and Separation: for being put into a Retort or broad Still, over a gentle fire, the VVater will run out, & the remaining Liquor will be clear Oyl. This work of Separation is very laborious: yet there are very artificial Vessels invented, by the help of which, all the VVater may be drawn off, and the flegm; onely pure Oyl will remain. Prepare a Glass-Vessel: let it be broad and grow narrower by degrees downwards, until it come to a point, like unto a Tunnel. Put the distilled VVater, which consisteth of the flegmatick VVater and Oyl into this Vessel; let it stand a while: the Oyl will swim on the top, and the VVater will sink down to the bottom. But stop the mouth of it with your finger; so that removing it away, the VVater may first run out, and the Oyl sink down by degrees. VVhen it is descended into the narrow part, so that the Oyl becometh next to your finger; stop the hole, and let the Orifice be but half open for the VVater to pass out: when

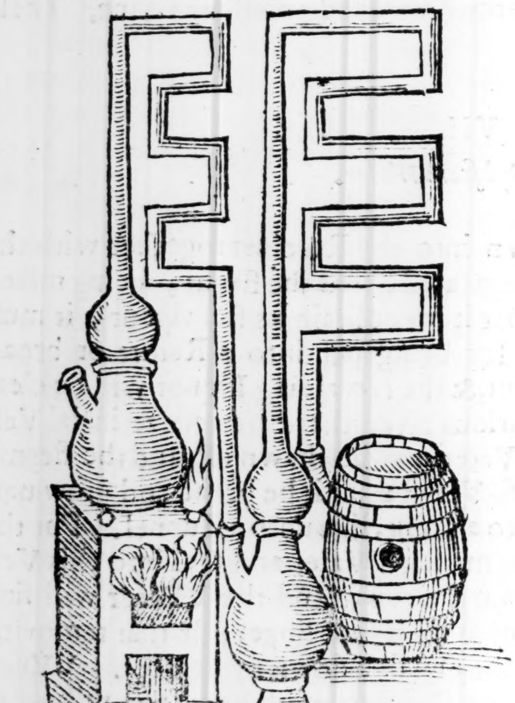
it

it is all run out, empty the Oyl into another small Vessel. There is another very ingenious Instrument found out for to separate Oyl, with a great belly and a narrow neck, which a little nose in the middle. Pour the Oyl mixed with Water into the Vessel, the Water will possess the bottom, the Oyl the neck. Drop Water gently into it, until the Oyl ascend up unto the nose: then encline the Vessel downward, and the Oyl will run out pure and unmix'd. When you have emptied out some, drop in more Water, until the Oyl be raised again unto the nose: then stop it down, and pour out the rest of the Oyl. But if the Oyl settle to the bottom, and the Water swim on the top, as it often hapneth, filtrate it into a broad dish, or any other Vessel with a cotten-cloth: the Water will run out, and the Oyl will remain in the bottom very pure.

CHAP. VIII.

How to make an Instrument to extract Oyl in a greater quantity and without danger of burning.

WE may with several sorts of Instruments, use several kindes of Extractions: among the rest, I found out one, whereby you may draw Oyl with any the most vehement fire, without any danger of burning; and a greater quantity, then by any other: and it is fit for many other uses also. Prepare a Vessel in the form of an Egg, of the capacity of half an ordinary Barrel: let the mouth of it, be of a convenient bigness to receive in your arm, when there shall occasion to wash it, or to fill it with several sorts and degrees of things to be distilled. Let it be tinned within; then set a brass head upon it of a foot high, with a hole in the bottom fit to receive the neck of the lower Vessel, and stop the mouth of it exactly. Out of the top of the head, there must arise a pipe of Brass, fifteen or twenty foot long, bended into several angles, that it may take up less room, and be more convenient to be carried. The other end of this Pipe, must be fastened into the belly of another Vessel, which must be of less capacity then the former, but of the same figure. Fix a head upon this also, with a Pipe of the same length, and bended like the former; whose lower end shall be received into another straight Pipe, which passing through the middle of a Barrel, at last falls into the Receiver. The manner of using it is this: Put your Leaves, Stalks, or Seeds, being beaten small, into the Brass-pot, and pour as much Fountain-water on as will cover them a handful or five large fingers over; then set on the head, and stop the joynts very close. Put the other end of the Pipe into the other Pot, and joynt them exactly: then set on the other head, and fasten the lower end of its crooked Pipe into that straight one; which passing through the Barrel, runneth into the Receiver. If the joynts be anywhere faulty, stop them with Flax, and paste them with Wheat-flour, and the white of an Egg; then rowl them about and tie them close with Fillets, cut out of a Bladder: for when the vapors are forced by the heat of the fire, they are so attenuated, that they will break forth through the least rime or chink, in spite of all your endeavors. Fill the Barrel with cold water, and when it beginneth to grow hot, draw it out through a Cock at bottom, and supply fresh water, that the Pipe may always be kept cool. At length, make the Pot boyl, at first with a gentle fire; then en-



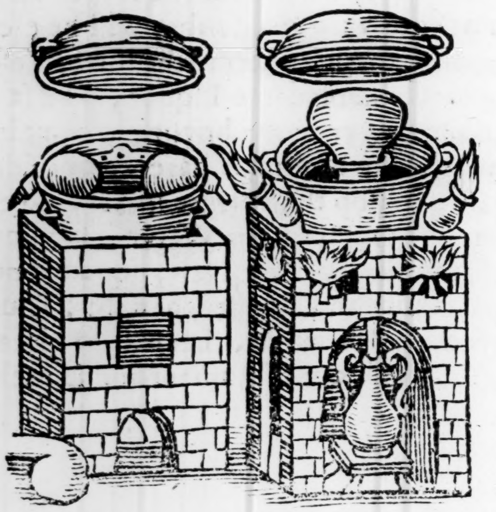
encrease it by degrees, until the vehemency of the heat, doth make the vapors hiss, as it were ready to break the Pipes, as they run thorow them; so they will be elevated thorow the retorted Pipes, and leave the phlegmatick water in the lower Vessel; till passing through the cold Pipe, they be condensed into Liquor, and fall down into the Receiver. If the water do consume away in the boyling, pour in more being first warmed, thorow a little Pipe which the Pot must have on one side with a Spigget to it, for this purpose: but be sure to stop the Spigget in very close, that there may be no vent. Afterwards, separate the Oyl from the Water, sublime and purifie it in another Vessel. Of all the Instruments that ever I saw, not any one extracteth a greater quantity of Oyl, and with less labour and industry then this. Thus you may without any fear of burning, draw Oyl out of Flowers, Leaves, Spices, Gums, and VVood with the vehementest fires; as also out of Juniper and Laurel-Berries.

Chap. IX.

The Description of a Descendatory, whereby Oyl is extracted by Descent.

I Cannot refrain from discovering here an Instrument found out by my own private experience, which I hope will be of no small profit to the Ingenious, by which they may draw Oyl out of any the least things without any fear of burning. For there are many tenuous, oyly Flowers, as of Rosemary and Juniper, and other things, as Musk, Amber, Civet, Gum, and such-like: out of which may be drawn Oyls very sweet and medicinable: but they are of so thin a substance, that there is a great hazard of burning them, when they are forced by the heat of the fire, without which, neither fat things will be elevated, nor Oyl extracted. Therefore to remedy these inconveniences, I have invented an Instrument, by which Oyl shall descend without any labour or danger of burning. Let a Vessel be made of Brass, in the form of an Egg, two foot high, and of the same breadth: let it be divided towards the top, of which the upper part must serve for a cover, and be so fitted to be received into the lower part, that the joynts may closely fall in one another, and be exactly stopt. In the lower part, towards the middle, about half a foot from the mouth; let there be a Copper-plate fitted, as it were the midriff; so that it may easily be put and taken out: in which must be made three hollow places to receive the bottom of three retorted Vessels, the rest of the plate must be pervious, that the boyling VVater and hot Spirits may have passage to rise upwards. Out of the sides of the Vessel there must be three holes, through the which the necks of the Retorts may pass, being glued and fastned to their Pipes with Flax, and tied with Fillets of Bladders: so that not the least Air, much less any VVater may flie out. VVhen you prepare to work, fill the Glass-Retorts with the things you intend to still, thrust the necks thorow the holes outward, and lay their bodies in the prepared hollowness of the cross-plate, somewhat elevated. If there remain any void space between the necks, and the sides of the holes they pass through, stop it with Flax, and tie it about with Fillets of Bladder, and fill the Vessel with with water, within three fingers up to the cross-plate. The Vessel, being covered, and the joynts well stopt and glued, and bound about; so that the force of the vapours arising, may not burst it open, and scald the Faces of the by-standers, kindle the fire by degrees, until it become very vehement: then wil the vapors make a great nose, almost sufficient to terrifie one, and first VVater, then VVater and Oyl will distil out. I cannot contain my self from relating also another Instrument invented for the same purpose. Make an oval Brass-Vessel, as I advised before, with a hole bored thorow the bottom: to which fasten a pipe that may arise up to the mouth of the Vessel, let the mouth of it be wide, like a trumpet or tunnel; so that the long neck of a Gourd-Glass may pass through the Pipe of it, and the wide mouth of the Vessel under, may by degrees receive the swelling parts of the neck. Adapt a cover to this Vessel that it may be close stopt and luted as we said before. You must make a Furnace on purpose for this use: for the fire must not be made in the bottom, but about the Vessel.

The



The use is this: Fill the Glass with Flowers or other things; put in some wire Lute-strings after them, that they may not fall out again when the Glass is inversed. Thrust the neck thorow the Brass-Pipe: set the Vessel on the Furnace, and fill it with Water round about the arising Pipe: put on the Cover, and plaister it about: set the Receiver under the Furnace that it may catch the dropping Water and Oyl: then kindle the fire about the sides of the Pot, the violence of which, will elevate vapors of burning water; which, beating against the concave part of the Cover, will be reverberate upon the bottom of the Gourd-Glass, whose fervent heat, will turn the Water and Oyl into vapor, and drive it down into the Receiver. I will set down some examples of those things which I made trial of my self. As,

How to extract Oyl out of Rosemary Flowers.

Fill the Retorts with the Leaves and Flowers of Rosmary, and set them in the Brass-Furnace: the fire being kindled will force out first a Water, and afterward a yellow Oyl, of a very strong and fervent odor; a few drops of which, I have made use of in great sicknesses, and driving away cruel pains. You may extract it easier, if you macerate the Flowers or Leaves in their own, or Fountain-water, for a week. In the same manner

Oyl of Citron-Pill

is extracted. When Citrons are come to perfect ripeness, shave off the peal with a gross Steal-File: put the Filings into a Pot, and set them to macerate ten days in dung, being close stopt up: then accomodate them to the Furnace, and kindle fire; an Oyl mixt with water distils out, of a most pleasant sent. The same may be done with Orange and Lemmon-peal. In places where Flowers and Fruits are not to be had, they cut off the tops of the Branches and Tindrils, and slice them into four-inch-pieces, and so distil them.

Oyl of Roses, and Citron-Flowers

is drawn after the same sort; a most excellent Oyl, and of an admirable savour. But because the Oyl is very hardly distinguished from the Water, pour the Water into a long Glass with a narrow neck, and expose it to the Sun being close stopt: the Oyl will by little and little, ascend to the top, which you must gather off with a Feather or pour out by inclining the Glass.

Sweet Oyl of Benjamin

is to be made, by putting Benjamin into a Glass-Retort, and fitting it to the Furnace: then encrease the fire without any fear of combustion, and you will obtain a fragrant Oyl, to be used in precious Oyntments. So Oyl of Storax, Calamite, and Labdanum, and other Gums. So also,

Oyl of Musk, Amber, and Civet

cannot be extracted more comodiously by any Instrument, Art, or Labour, then by the aforesaid; for they are of so thin a substance, that they can hardly endure any the least heat, without contracting a scurvy base stink of burning; yet by this Artifice, it may be drawn out very safely. I see nothing to the contrary, but that we may extract Oyl out of Spices also, very securely by the same Artifice.

CHAP.

Chap. X.
How to extract Oyl out of Gums.

There is a peculiar Extraction of Oyl out of Gums: which, although they require the same means almost as the former, that is, the mixing them with Waters, and macerating them for many days, then putting them into a Brass-pot, and by a vehement fire, forcing out the Oyl with the Water; yet doth it come out but in a small quantity of an excellent odor, and free from the stink of the fire; as thus they usually deal with Opoponax, Galbanum, Storax, and others. But they are distilled also another way, by Ashes; which doth require the diligent attendance of the Work-man, and a singular judgement and provident dexterity in him: for it is rather an ingenious then painful Operation. I will set down an example,

How to extract Oyl out of Benjamin.

Macerate the Benjamin in Rose-water; or omitting that, put it into a Retort: set the Retort into a Pot full of Sand; so that it may fill up the space between the sides of the Pot, and bottom of the Retort: put the neck of it into a Receiver with a wide belly: kindle the fire by little and little; and without any haste or violence of heat, let the Water distil: by and by increase the fire, that the Oyl may flow out; yet not too intensely, for fear of burning; but moderately between both: the oyly vapors will straight fill all the Receiver; then will they be condensed and turn into flakes, like Wool; and sticking to the sides and middle of the Glass, present you with a pleasant spectacle: by and by they are turned into little bubbles, so into Oyl, and fall down to the bottom: keep the fire in the same temper, until all the Feces are dried; then remove it, for fear of ustion.

Oyl of Storax

is drawn in the same manner; but if the Storax be liquified, it will run with a gentle fire: it is of a strong and quick odor. *Calamites* requires a more lively fire, such as was used in Benjamin, and a diligent attendance: for too much fire will cause adustion in it.

Oyl of Ladanum.

Beat the Ladanum, and macerate it fifteen days in *Aqua Vitæ*, or Greek Wine: at least ten: for the longer it infuseth, the sooner it will run into Oyl: draw it with a gentle fire, it will distil out by drops after the Water.

Oyl of Turpentine

is extracted easily; for it floweth with a gentle fire: but beware in the operation, that no smoak do evaporate out of it; for it presently will take fire, and with a magnetick vertue attract the flame, and carry it into the Retort, where it will hardly be extinguished again: which will happen in the extraction of

Oyl of Olives, and Linseed Oyl.

If you distil common Oyl, it will hardly run; yet encreasing the fire, it will come out in six hours: you must be very careful, that the Ashes and Pot do not wax too hot: for if the Oyl within take fire, it will break the Vessels, and flie up, that it can hardly be quenched, and reach the very cieling; so that it is best to operate upon Oyls in arched Rooms. From hence Artificers of Fire-works, learned to put Oyl in their Compositions, because it quickly taketh fire, and is hardly extinguished.

CHAP. XI.
Several Arts how to draw Oyl out of other things.

THe Nature of things being diverse, do require divers ways of distilling Oyl out of them: for some being urged by fire, are sublimed, and will not dissolve into Liquor; others cannot endure the fire, but are presently burned. From which variety of tempers, there must arise also a variety in the manner of Extraction. I will set down some examples of these, that ingenious Artists may not despair to draw Oyls out of any thing whatever.

Oyl out of Honey

is hard enough to be extracted: for it swells up with the least heat, and riseth in bubbles; so that it will climbe up thorow the neck of the Retort, though it be never so long, into the Head, and fall down into the Receiver before it can be dissolved into Liquor or Oyl. There are divers remedies found out to help this: Take a Glass with a short wide neck, put your Honey into it, and stop it in with Flax quite over-laid two fingers thick. This will repress the Honey when it swelleth and froaths, and make it sink down again. Clear Water will drop out at first: but when it beginneth to be coloured, take away the Receiver, and set another in the place; so keep the Waters severally. Or put Honey into any Vessel, so that it may fill it up four large fingers above the bottom, and cover it close, as the manner is: then dig a hole in the ground, and set the Vessel in, as far as the Honey ariseth: then lute it, and plaister it about four fingers above the Ground, and drie it well; kindle your Coals round about it; then will the Honey grow hot, and by degrees stick to the Pot: but because the heat is above it, it cannot swell up, but very easily distilleth Water and Oyl; first, yellow, next reddish, until the Honey be turned into a very Coal. There is another way, which may be performed by any Woman: Pour the Honey into a new Pipkin, and cover it; dig a hole, and bury it abroad about a cubit under Ground; there let it putrifie for ten days: then take it up, and there will swim on the top of the Honey a Chrystal Liquor, which you must strain out, and stop the Pipkin again, and bury it as before. About a week after, view it again, and strain out the over-flowing water; so the third and fourth time, until all the Honey be converted into water, which you may see by uncovering the Pipkin: distil the Water according to Art, and it will yield Water and Oyl easily enough.

Oyl of Camphire.

Beat Champhire very small, and put it into common *Aqua Fortis*, made of Salt-Peter, and Coppress distilled and clarified: set the Pot in a Bath or Stove for half a day, and you will see a cleer bright Oyl swim on the top of the Water: incline the Pot gently, and pour it off, and clarifie it in a Retort; so shall you have a beautiful, thin and sweet Oyl.

Oyl of Paper and Rags.

Rowl up your Paper like a Pyramide, as Grocers do, when they lap up any thing to lay by, or send abroad: clip the edges even; and taking hold of the top of it with a pair of Pincers; set it on fire with a Candle; and while it flameth, hold it downward over a broad dish half a finger distant from the bottom, so that the smoak may hardly flie out: and still as the fire consumes the Paper, let your hand sink, that may always keep the same distance from the Dish. When it is quite burnt, you will finde a yellow Oyl, stinking of burning, upon the bottom of the dish. Gather it up, and reserve it: it is excellent to drive away freckles and pimples in womens faces, being applied. Almost in the same manner

Oyl of Wheat.

Lay your Wheat plain upon a Marble-Morter, being turned with the bottom

upwards, and cover it with a plate of Iron, almost red hot, and press it hard: out of the sides there will be expressed an Oyl of a yellow colour, and stinking of burning, which is good for the same purposes; that which is good to refresh decayed Spirits, is prepared another way.

Chap. XII.
How to extract Oyl by Descent.

THe way is common and vulgar to all; for it is done by Ustulation: but the Oyls are of a most offensive savor, and can be used only in outward Medicines; for they are not to be taken inwardly. Prepare a Pipkin made of tough Clay, and able to endure fire, well vernished within, that there may be no suspicion of running out: let the bottom be full of holes, set upon another earthen Pipkin, whose mouth is large enough to receive the bottom of the upper Pipkin; lute them close together. Fill the Pipkin with slices of your VVood: cover it, and lute it. Then dig a hole, and set the Pipkins into it, and fling in the Earth about it, and tread it down close, and throw Sand over it two inches thick: make a gentle fire just over the Pipkin; which you must encrease by degrees, until the Pipkin have stood there a whole day. After this, remove the fire: and when the heat is spent, dig up the Pipkins, and you will finde the Oyl strained down into the lower; which you must distil again in a Retort, to purifie it from filth. To add something to the former invention, I always do thus: I make a Tressel with Legs of two foot in length. There must a hole be bored in the Plank of it, to receive the neck of the Limbeck. Upon the Tressel fasten an Iron-plate to keep the VVod from burning. Underneath, about the middle of the Feet, fasten a Board, upon which the Receiver may stand, and meet with the neck of the inversed Vessel, which being filled with the materials to be stilled, kindle a fire about it. Therefore if you would extract

Oyl out of Lignum Guaiacum,

fill it with the Dust of Lignum Guaiacum, and lute it close with Straw-Mortar, twice or thrice double: when it is dried in the Sun, put into the neck, wire Strings, and thrust it through the hole of the Tressel into the mouth of the Receiver, and mortar them together. Then kindle the fire on the Plate about the body of the Limbeck, at some distance at first, and by degrees nigher and hotter: but let it not be red hot, until you think it be all burned: then remove the fire, and let it rest a while, until it be cold, and you shall finde in the lower Vessel a black stinking burnt Oyl. In this manner is Oyl drawn out of Juniper, Cypress, and Lignum Aloes: but in this last, you must use more Art and diligence, and a gentle fire, because it is mixed in Oyntments.

Chap. XIII.
Of the Extraction of Essences.

VVE have delivered the several kindes of Extraction of Oyls, now we are come to Quintessences, the Extraction of which, we will here declare. The Paracelsians define a Quintessence to be the Form, or Spirit, or Vertue, or Life, separated from the gross and elementary impurities of the Body. I call it the Life, because it cannot be extracted out of the Bones, Flesh, Marrow, Blood, and other Members: for wanting Life, they want also the Quintessence. I say, Separated from elementary impurities, because when the Quintessence is extracted, there remaineth only a mass of Elements void of all power: for the Power, Vertue, and Medicinable qualities, are not the Elements, but in their Essences, which yet are Elements, and contain the vertue of the Elements in them, in the highest degree: for being separated from the grosness of their bodies, they become spiritual, and put forth their power more effectually and strongly when they are freed from

them, then they could while they were clogged with the Elements. They are small in bulk, but great in operation. The strength of Quintessences, is not to be judged by the degrees of their qualities, but of their operation: for those which soonest and clearliest root out a disease, are reckoned in the first degree. So the essence of Juniper, is reckoned the first degree of operation, because it cureth the Leprosie by purging the Blood onely. The essence of Ambar in the second, because it expelleth poyson, by purging the Heart, Lungs and Members. Antimony in the third, because (beside the former vertues) it also purgeth the Body. But Gold of it self alone, hath all those vertues, and reneweth the Body. Wherefore the fourth degree and greatest power, is attributed to it. Bet how to extract these Essences is a very difficult work; for they may be either Oyl, or Salt, or Water, or of Extraction: some, by Sublimation; others, by Calcination; others, by Vinegar, Wine, Corrosive Waters, and such-like. So that several kinde of menstruums are to be provided according to the nature and temper of things. I will set down some Rules for the chusing of proper menstruums. Let the menstrum be made of those things which are most agreeable to the things to be extracted, and as simple as may but: for Essences ought not to be compounded, mixed, or polluted with any thing; be pure, simple and immaculate. But if there be a necessity of adding some thing let them be separated after extraction. If the Essence of any Metal be to be extracted by Corrosives, separate the Salt from the Waters, after the work is done, and use those Salts only, which will easily be taken out again: Vitriol and Allom are very difficult to be separated, by reason of their earthy substance. Moreover, use not a watry menstruum, for a watry Essence; nor an oyly menstruum, for an oyly Essence because being of like natures, they are not easily separated: but watry Menstruums for oyly Essences: and so on the contrary. I will set before you some examples in Herbs, fat of Flesh, and other things; by which you may learn of your self how to perform it in the rest. There are an infinite number of Essences, and almost many ways of Extraction: of them, some I shall shew unto you, whereof the first shall be

How to extract the Essence out of Civet, Musk, Ambar, and other Spices.

Take Oyl of Ben, or of Almonds, mix Musk, Ambar, Cinnamon, and Zedoary, well beaten in it: put it in a Glass-bottle, and set it in the Sun, or in Balneo, ten dayes: then strain from it the Dregs, and the Essence will be imbibed into the Oyl; from which you may separate it in this manner: Take *Aqua Vitæ*, and if it be an odoriferous Body, Fountain-water, three or four times distilled, mix with the aforesaid Oyl, and stir it about, and so let it digest for six dayes: then distil it over Cinders: the hot Water and the Essence will ascend, and the Oyl remain in the bottom without any sent. Afterwards, distil the *Aqua Vitæ*, and the Essence in Balneo, until the VVater be evaporated, and the Essence settle to the bottom in the form of an Oyl. If you will do it with *Aqua Vitæ* alone, slice the Roots of Zedoary, beat them and infuse them in so much *Aqua Vitæ* as will cover them three fingers over in a Glass Bottle: let them ferment for ten dayes according to Art; then distil them over Cinders, or in Sand, until nothing but VVater run out; yet have a care of burning it. Take the distilled Liquor, set it in Balneo; and with a gentle fire, let the *Aqua Vitæ* evaporate, and the Quintessence of Zedoary will settle in the bottom, in a liquid form. Next

To extract Essence out of Flesh.

Out of three Capons, I have oftentimes extracted an Essence in a small quantity, but of great strength and nutriment, wherewith I have recovered life and strength to sick persons, whose Stomacks were quite decayed, and they almost dead for want of nourishment, having not been able to eat any things in three dayes. Take Chickens, or Hens, or Capons; pluck them, and draw their Guts out; beat them very well, and let them boyl a whole day in a Glass-Vessel, close stopt, over warm Embers, until the bones, and flesh, and all the substance be dissolved into Liquor: then strain it into another Vessel, through a Linen-cloth, and fling away the Dregs: for the

re-

remaining Bones are so bereft of Flesh, sent, or any other quality, that a Dog will not so much as smell to them; which is an assured Argument that their goodness is boyled out. Pour the strained Liquor into a Glass-bottle, and dissolve it into vapor in a gentle Bath; the Essence will remain in the bottom, either hard, or soft, like an Oyntment, as you please, of a most admirable vertue, and never sufficiently to be commended.

To extract Essences out of Salts.

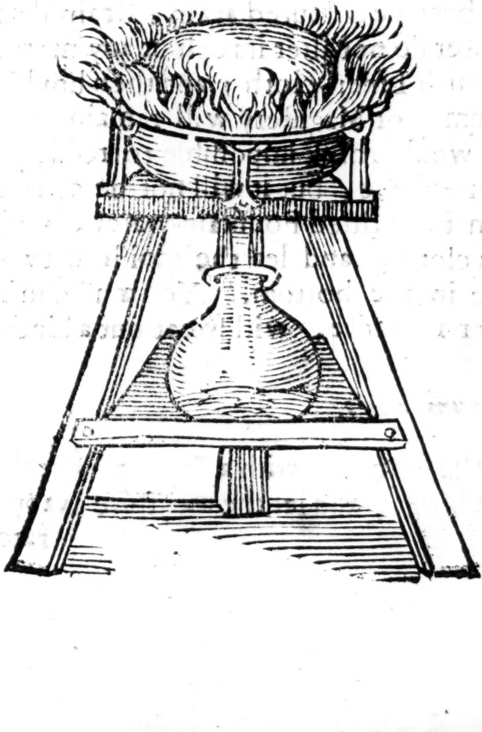
Take Salt and calcine it according to Art; if it be volatile, burn it, and grinde it very small: lay the Powder upon a Marble in a moyst Cellar, and set a Pan under it to receive it as it dissolveth: let it ferment in that pan for a month; then set it in Balneo, and with a gentle fire let it distil: cast away the sweet Water, that comes from it, and set that which remains in the bottom, to ferment another month, then distil out the sweet Water, as before: and do this, while any sweet VVater will run from it: keep it over the fire until the moysture be all consumed; and then what remains settled in the bottom, is the Quintessence of Salt; which will scarcely arise to two ounces out of a pound.

To extract Essences out of Herbs.

Beat the Herbs, and set them to ferment in dung for a month, in a convenient Glass-Bottle: then distil them in Balneo. Again, set them in dung for a week, and distil them in Balneo again; and thus macerate them so long as they will yield any Liquor: then pour the distilled Water upon the Herbs again, and distil them in this Circulation for six dayes, which will make it of a more lively colour: draw of the VVater by Balneum and the Essence must then be expressed out in a press: ferment it in dung for five days, and it will yield you the sent, colour and vertues of the Herbs in perfection. A way to extract

The Essence of Aqua Vitæ.

It is a thing bragged of by thousands; but not effected by any. I will not omit the description of it, which I have found out, together with a Friend of mine very knowing in Experiments, by the assistance of *Lulius*. Provide some rich, generous, old VVine, bury it in dung for two months, in large Bottles close stopt and luted, that they may not have the least vent. The whole business dependeth on this: for if this be not carefully look to, you will lose both your cost, and your labour: the month being past, distil it in an ordinary Stillatory, reserve the Spirits by themselves. The Dregs and Fæces of the Wine must be buried again, and the Spirits be distilled out as before, and reserved by themselves. Distil the Fæces until they settle like Honey or Pitch: then pour on the phlegm upon them, wash them, and lay them to dry: then put them into a Porters, or Glass-makers, Furnace, and with a vehement fire burn them into white Ashes: wet them with a little VVater, and set them in the mouth of the Furnace, that they may be converted into Salt. There is no better mark to know the perfection of your work, then by casting some of it on a red hot Plate of Iron: if it melt and evaporate, it is well done; otherwise, you must rectifie it. Mix the Salt with water, and put it into a Glass bottle with a long neck; stop it with Cork and Parchment: then set on the Head, and kindle the fire; the force of which, will carry it up thorow all the stoppage into the Head, and there it sticks to the sides like dust; the VVater will remain quiet in the bottom, in which you must again mingle the Salt; and so by a continual Circulation, draw it out of it self, until it be divested of all its Grossness, and obtain a more thin and subtile Essence.



Chap.

CHAP. XIV.

What Magisteries are, and the Extraction of them.

I Said, That Quinteſſences do participate of the Nature of mixt Bodies; on the contrary, a Magiſtery taketh the temper of the Elements: ſo, that it neither extracteth the Spirits nor the Tincture, but a certain mean between both. A Magiſtery therefore, is what can be extracted out of things without ſeparation of the Elements. Eſſences do oftentimes keep the colour of the Bodies out of which they are extracted: Tinctures always do it, Magiſteries never. The means of extracting Magiſteries, is various, according to the diverſity of Natures in things. I will ſet down for an example and pattern

How to extract a Magiſtery of Gems, Coral and Pearl.

Beat the Gems, and ſet them in *igne reverberationis*, till they be calcined; mix them with an equal quantity of Salt-Peter, and diſſolve them in *Aqua Vitæ*: pour out that which is liquified, and let the remainder of the Powder be calcined better; then lay it in *Aqua Vitæ* again, and do this till it be all diſſolved. Set this water in a hot Furnace, until the moyſture be all evaporated; and what ſhall remain in the bottom, is the Magiſtery of Gems. Pearls muſt be diſſolved in Vinegar; and if poſſible, in juice of Lemmons. You may augment the ſtrength of the Vinegar by thoſe things, which, as I ſhewed you in *Aqua Vitæ*, do quicken the Vertue of it, that is, its own Salt, being diſſolved and macerated in Balneo, or in Fimo, for a month: then diſtil the Menſtruum, and in the bottom will remain the Magiſtery of Pearls.

Of Charabes.

I will deliver to you the way that I uſe; for the Paracelſians do either conceal it, or not know it. Beat your Gum very ſmall, and diſſolve it in *Aqua Vitæ*: when it is liquified, pour that out, and put in freſh: let them macerate for a month; and when all is diſſolved, mix the waters all together, and let it evaporate over a fire; ſo in the bottom will remain the Magiſtery of Charabe. It will take away ſcars in the Face, and cure the Vertigo.

The Magiſtery of Guaiacum

is an excellent Remedy againſt the Pox, and is thus extracted. Take the ſhavings of Lignum Guaiacum, or the duſt of it, which Turners work off: for the File, by continual Frication, heats it, and exhauſteth the beſt Spirits. Lay it in clarified *Aqua Vitæ* a whole day: when the water hath contracted a red colour, which will be when it hath ſucked out the oylineſs and ſubſtance of it, ſtrain it out, and pour in freſh. Then ſtir it about, until the water become coloured again; ſtrain that out alſo, and put in as much more, until the water do not alter its colour any more. Then ſtrain it in a preſs, and diſtil the juice through Linen-cloth; and then boyl it till the moyſture be conſumed: the Oyl, or Gum, or Magiſtery will remain of a bright colour, and moſt ſweet ſent, which you would think impoſſible to reſide in ſuch Wood. You may extract the ſame in a ſhorter time; but it will not be of the ſame value: for if you lay the duſt of Guaiacum in diſtilled Fountain-water, boyl it for half a day, ſtrain it, diſtil it thorow a cloth, and let the moiſture evaporate over a fire; the ſame Gum will ſettle in the bottom. You muſt chuſe the moſt Gummy Wood, which being held neer a Candle, will ſweat out a kinde of Oyl.

The Magiſtery of Lignum Aloes.

Take the ſhavings of the Wood worked off, as the former, with a Turners wheel; lay it in *Aqua Vitæ* till it colour it; then ſtrain it out, and let the moyſture evaporate

rate over a fire; and in the bottom of the Glass, you will finde a most odoriferous Oyl, excellent to be used in sweet Oyntments.

The Magistery of Wine, commonly called the Spirit of Wine.

I will first set down the Paracelsian way of extracting it, and afterwards my own; because we cannot use that in our Countries. Pour some strong generous good Wine into a Glass-Bottle: so that it may fill two parts of it; stop the mouth of it very exactly, either with *Hermitis* Sigillum, or a strong Glue, which I shall hereafter describe unto you; and so set it in Fimo three or four months, with an unintermitted fire. In the Winter set it out in the Frost for a month, and let it freeze: the Spirit or Magistery will retire into the Centre, because its fiery Essence maketh it uncapable of conglaciation. Break the Vessel, cast away the congealed part, and reserve the liquid; which being circulated in a Pelican for a month, will yield you what you seek for. My way is, to put the aforesaid Wine into a round Glass-Vessel: let it ferment in Fimo, conglaciate it, as I shall shew you; and then breaking the Vessel to reserve the unfrozen liquor, in which you will finde a great deal of vertue: but if you desire to have it better, you may perfect it by Circulation.

Chap. XV.

How to extract Tinctures.

A Tincture is the purest and most active part of a coloured body extracted; the noblest Essence in a Compound. It is extracted out of Gems, Flowers, Roots, Seeds, and such-like. It differeth from a Quintessence in this, that it especially draweth the colour of the Body from whence it is extracted; and requireth Art, and Cunning, and diligent Attendance, more then labour. It is separated by Distillation, clear from any oylinesss or matter; free from the commistion of other Elements, or any impure substance; it imitateth the clearness and perspicuity of the Air: and in that brightness represents the colour of the Gem or Flower, from whence it was drawn; of so pure a substance, that in many yeers it will not have any dregs in it, but will continue in a perpetual cleerness, subtilty, and strength. After the extraction, the matter remaineth discoloured, and useless for any thing. I will present some examples to you how to extract the Tincture out of Metals and Flowers, *&c.*

How to draw out the Tincture of Gold.

If the Vertues of this never-sufficiently-praised Metal, were known, as well for the health of the Body, as the conveniency of mens living, it would be adored with a greater devotion then it is already. The Apes of wise Nature, cunning inquirers in Experiments, perceiving a certain Glory and Brightness in Gold, and an attractive or magnetick Vertue, (if I may so say) which at first sight draws every mans eye to look upon its Majesty and Beauty, and tempts our hands to touch and handle it, and even our mindes to desire it, so that even Infants do rejoyce, and laugh at the sight of it, and reach their arms out after it, and catch it, and will by no means part from it; presently conjectured, that there was some extraordinary Vertue in it for the health of man. Astrologers, seeing it contend with the Sun in Beams, Brightness and Glory, and to have a Prærogative of Majesty among Metals, like the Sun among the Stars, do therefore set it down for a Cordial, and a Destroyer of Melancholy, and all the ill Companions of it. Refiners say, That the Elements are so proportionably mixt in the Composition of it, so pure and compacted, that they account it a most exactly tempered body, and free from corruption: in which there is nothing deficient nor superfluous; so compact and close, that it will not onely endure the fire without consumption, but will become more bright and refined by it. It will also lie under Ground thousands of yeers without contracting any rust: neither will it foul the hands like other Metals, or hath any ill sent or taste in it. Wherefore, say they, being taken into our Bodies, it must needs reduce the

Elements and humors into a right temper, allay the excessive, and supply the defective, take away all putrefaction, refresh the natural heat, purge the blood, and encrease it; and not onely cure all sicknesses, but make us healthy, long-lived, and almost immortal. *Rainoldus*, *Raimundus*, and other Physitians of the best esteem, do attribute to Gold, a power to corroborate and strengthen the Heart, to dry up superfluities and ill humors, to exhilarate and enliven the Spirits with its Splendor and Beauty, to strengthen them with its Solidity, temper them with its Equality, and preserve them from all diseases, and expel Excrements by its Weight: by which it confirmeth Youth, restoreth Strength, retardeth old Age, corroborateth the principal Parts, openeth the Urinary Vessels, and all other passages, being stopt: cureth the Falling-sickness, Madness, and Leprosie, (for which cause, *Osiander* the Divine, wore a Chain of Gold about his neck) and also Melancholy, and is most excellent against Poyson and Infections of the Plague. We will now examine whether the old or new Physitians knew the way to prepare it aright, to perform these admirable Effects. *Nicander* doth mightily cry up for an Antidote against Poyson, Fountain-water in which Gold hath been quenched; supposing, that it imparteth some of its Vertue to the Water in the extinction. *Dioscorides*, *Paulus Ægineta*, and *Aëtius*, affirm the same. *Avicenna* saith, That the filings of it helpeth Melancholy, and is used also in Medicines for the shedding of the Hair, in liquid Medicines, or reduced into very fine Powder; it is used in Collyriums, or Medicines for the Eyes, for the pain and trembling of the Heart, and other passions of the Minde. *Pliny* useth it burnt in an earthen Pipkin, with a treble quantity of Salt; whereby it will communicate its Vertue, but remain entire and untouched it self. He also makes a Decoction of it with Honey. *Marsilius Ficinus* saith, It is of a solid substance, and therefore must be attenuated, that it may penetrate the Body. But he is ignorant of the way of it, onely he adviseth to give it in Cordial-waters, being beaten out into thin Leaves; for so the Water will suck out the Vertue of it: or else by extinguishing it in Wine. There are some of *Pliny*'s Scholars, who would have the parts of a Hen laid in melted Gold, until it consume it self; for the parts of a Hen are Poyson to Gold. Wherefore *Ficinus* mixeth Leaf-Gold in Capon-broath. Thus far the Grecians, Latines, and Arabians, have discoursed concerning the Extraction of the Tincture of Gold; but they have erred far from the Truth: for what a vanity is it to imagine, that quenching it in Water, can extract the Vertue of it? or, that the heat of Man's Body, though it be liquified and be made potable, can draw any thing from it, when the force of the most vehement fire is ineffectual, and cannot work upon it? I have made trial of it in a most violent fire for the space of three months, and at last I found it nothing abated in weight, but much meliorated in colour and goodness; so that the fire, which consumeth other things, doth make this more perfect. How then can it be concocted by the heat of Man's Body, which is scarce able to concoct Bread? And how can it impart its Vertue by Extinction, when neither *Aqua Vitæ*, nor any strong Waters can alter the colour or taste of it? I will set down what I have seen. The later learned Men, and curious Inquirers into Nature, affirm, That the Magistery, Secret and Quintessence of Gold, consisteth in the Tincture: so that the Vertue, Power, Life and Efficacy of it, resideth in the Colour. Wherefore it will be no small Secret to know how to extract the Tincture; no small labor and pains: for those who pretend to speak of it, do it so intricately and obscurely, that they rather seem to obscure it, or not to understand it, then to discover or teach it. Know therefore, that the Tincture cannot be extracted, but by perfectly dissolving it in Strong Waters; and that it cannot be dissolved, as the work requireth, in common *Aqua Fortis*, or Royal Waters, because the corrosive Salts in them, are not perfectly and absolutely dissolved into Water. Wherefore you must learn by continual solution and immission, so to distil them, that the whole substance of the Salt may be melted; which must be done by reiterating the Operation. I have informed you, what Salts are easie to be separated, the which must onely be used in this Work. After perfect solution, cast in that Menstruum or Water, which I have often mentioned for the Extraction of Essences or Colors. I have with great joy beheld it attract to it self the Golden, Yellow,

or Red-colour, and a white dust settle down to the bottom. We must then separate the Salt from the Menstruum: dissolve it, and let the liquor evaporate away, and there will remain true potable Gold, the right Tincture, and that great Arcanum of Philosophers, disguised with so many Riddles; so thin, that it will easily penetrate the Body, and perform those wonders, which Antiquity could only promise.

Tincture of Roses.

Cut Red Rose-Leaves with a pair of Shears into small pieces; lay them in *Aqua Vitæ*, and they will presently dye it with a sanguine color. After three hours, change those Leaves, and put in fresh ones, until the water become very much coloured: then strain it out, and let the Liquor evaporate quite away, and in the bottom will remain the Tincture of Roses. The same may be done with Clove-Gilliflowers. We may also do it another more perfect way, without *Aqua Vitæ*. Fill a wide-mouthed Glass, with Red-Rose-Leaves: set i into a Leaden-Limbeck, and fill it with other Roses: then set on the Head, and kindle the fire; whereupon the vapours will arise, and fall into the Glass, of a sanguine-colour. This is a new way of extracting Tinctures, which may be used in any coloured Flowers. So the

Tinctures of Marigolds, Violets, Bugloss, and Succory-Flowers.

If you extract them the former way, the Tincture of Marygolds will be yellow; of Buglos, Violets, and Succory-Flowers, Red; because the colours of those Flowers, is but thin and superficiary: so that it expireth with a little heat, and is red underneath.

Tincture of Orange-Flowers of an excellent sent.

Cut the Orange-Flowers into small pieces, macerate them in *Aqua Vitæ*; and when the Water is turned yellow, and Flowers have lost their sent, change them, and put in fresh, until the Water become very sweet, and well-coloured, and somewhat thick: then strain it, and let it evaporate: it will leave behinde it a Tincture, enriched with the sent and vertues of the Flowers.

Tincture of Coral.

Beat the Coral to Powder, and with a vehement fire turn it into Salt; add an equal quantity of Salt-Peter to it: then extract the Salt with *Aqua Vitæ*, and it will bring out with it, the Tincture of a wonderful vertue.

Chap. XVI.

How to extract Salts.

Salts do retain the greatest part of the Vertue of those things, from whence they are extracted; and therefore are used to season the sick persons meat: and otherways, because they have a penetrative quality. It was a great Question among the Ancients, Whether Salts retained the vertue of the things; or, whether they lost some in the fire, and acquired others: but it is now manifested by a thousand Experiments, that the vertues do not onely remain in them, but are made quicker and more efficacious.

Salt of Lemmons.

Distill the Lemmons with their Peels and Juice: reserve the Water, and dry the rest in the Sun, if the season permit it; or in an Oven. Put them in a Pot close luted, and calcine it in *igne reverberationis*. Then dissolve the Powder in the Water, and boyl them in a perfect Lye: cleanse it with a Feather, that the Dregs may settle to the bottom: purifie it, and let the Liquor evaporate: so the Salt will remain in the bottom; which is most excellent to break the Stone in the Bladder.

Salt of Pellitory of Spain.

Dry the Roots, and burn it in a close luted pot, for three dayes, until it be reduced into white Ashes: pour on its own Menstruum: distil it, and calcine it again; so the third time: then cleanse it with a Feather, boyl it in an earthen vernished Pipkin, with the white of an Egg to clarifie the Salt: at length, a white grained Salt will appear.

Salt of Cumine.

Put the Roots, Leaves, and Flowers in a close luted Vessel, and dry them, and put them into a Potters Furnace, till they be burned to Ashes. In the mean while, distil the Roots, Leaves and Flowers; or, if you please, make a decoction of them; and of that decoction, a sharp Lye: which, being strained very clean through a Linen-cloth three or four times, must be boyled to a Salt in a Glass-Vessel. If you desire it very fine and white, strow the Salt upon a Marble, and set it in a moist place with a pan underneath to receive it as it dissolveth: cleanse the filth still away; and do this three times, until it become of a Chrystal colour; so reserve. In this manner *Sal Alchali* is made.

Of Saxifrage.

It is made like the former: if you season your meat with it, it protecteth from all danger of poysoned bread or meat; conserveth from the contagion of pestilential and infectious Air. The same may be extracted out of other Alexipharmacal Bodies, which Princes may use at meals, instead of ordinary Salt; for they scarce differ in taste. A Salt may be made of Thapsia, very good to remove the Stone in the Bladder or Kidneys, and to dissolve the Tartar, or viscous Concrescency; to kill the Worms, and purge the Blood; to provoke sweat by being often taken, and is admirable in Venereal Diseases. The Salt of Pimpernel, being taken three days, and the third month, for a mans whole life-time, secureth him from the Dropsie, Pthisick, and Apoplexy. It also preserveth from Infection and pestiferous Air, and helpeth digestion in a weak Stomack. But it is to be observed, That these Salts must not be eaten every day, lest they become too familiar to the Stomack, and be taken for food. There may be a Salt also extracted out of the filings of Lignum Guaiacum, which is excellent in the French Pox, being taken as the former. By these you may learn to make other Salts.

CHAP. XVII.

Of Elixirs.

Elixirs are the Conservators of Bodies in the same condition wherein they finde them: for their Vertue is to preserve from corruption, not by meliorating their state, but by continuing it; and if by accident, they cure any Diseases, it is by reason of their tenuity. They have a double Vertue to preserve from sickness, and continue health, not onely in Men, but to preserve Plants also. They imitate the qualities of Balsam, and resort chiefly to the Heart, Brain, and principal Parts, where the Spirits reside. There are three kinds of Elixirs; of Metals, of Gems, and of Plants; as of Roots, Herbs, Flowers, Seeds, Woods, Gums, and such-like. An Elixir differeth from Essences, Tinctures, and the rest; because it is compounded of many things void of fatness: therefore it cannot be an Oyl, because it wanteth perspicuity and clearness; not an Essence, because it is a Compound; not a Tincture, but a mean between all, and of a consistence most like to Water: whence it had its name *ab eliquesco*, to be dissolved or liquified.

To make Elixir of Pimpernel.

Dig up the Roots in a convenient time, and macerate them in their Water, putting some weight on them to depress them under Water: when the Flowers are blown, gather them, and macerate them in the same manner, in a peculiar Vessel: the same

must be done with the Seeds: Then put them in an Alimbeck, and draw out the Water and Oyl, until the Fœces remain dry: then separate the Oyl from the Water, and circulate it in a Pelican for two months: then take it out, and reserve it for your use.

An Elixir of many things.

Many Compositions of Elixir, are carried about, which are erroneous and false to my knowledge, and of so hard a work to extract the Oyl and Water, that you will more probably lose your time and cost, then gain any good by them: for they are made for pomp and magnificence, rather then for the benefit of man. Besides, I have found them often fail in the performance of what was promised from them, and cannot be made according to those descriptions: But here I will deliver one to you which will perform far more then is promised. Take the Flowers of Sage, Origanum, Mugwort, Savory, Elder, Sage-Leaves, white Mint, Rosemary, Basil, Marjoram, Peniroyal, Rose-buds, the Roots of Betony, Pellitory, Snake-weed, white Thistle, Aristolochy, Elder, Cretan-Ditany, Currants, Pine-Apples, Dates, Citron-Pill, of each an ounce and a half; Ginger, Cloves, Nutmegs, Zedoary, Galangal, white and long Pepper, Juniper-berries, Spikenard, Mace, Cubebs, Parsley-seed, Cardomoms, Cinnamon, Stæchados, Germander, Granes, Rose of Jerusalem, Doronicum, Ammoniac, Opoponax, Spodium, Schæinanthus, Bdellium, Mummy, Sagapenum, Champhire, Mastick, Frankincense, Aloes, Powder of Ebony, Bole-Armenick, Treacle, Musk, Galls, Mithridate, Lignum Aloes and Saffron, of each three drachms; of clarified Sugar, thirteen pounds; of Honey two. I exclude Pearl, Rubies, Jacinths, Saphires, Emeraulds and Leaf-Gold, from the Composition; because, as I have proved before, they have no operation; especially, thus exhibited: and therefore are used in Medicines by none but ignorant Physitians. Reduce all these into Powder, and put them into a Pelican or blinde Alimbeck, with twelve pound of *Aqua Vitæ*, very well clarified, as though the whole work depended on it: let it circulate in Balneo a whole month: take off the yellow Oyl or Quintessence of all, with a Silver-Spoon, and add to it a drachm of Musk and Amber, and set it by for your use in a Glass-bottle close stopt. Distil the remainder, and it will afford a yellow cleer water: but you cannot extract the Oyl without a stink of burning. I have very exactly extracted Oyl of Gums, Roots and Seeds of the forementioned: and mixing them together, have effected strange things with them. Most of their operations are against Poysons, and Pestilential Contagions; especially, those that are apt to seize on the Spirits; for a drop of it, being anoynted on the Lips or Nostrils, reviveth the Soul, and keepeth it in perfect Senses at least six hours.

Chap. XVIII.

Of a Clyssus, and how it is made.

THat there may nothing be omitted, I will now shew what a Clyssus is, and how it may be made. A Clyssus is the Extraction of the Spirits of every part of a Plant, united in one common entity. There are in a Plant, the Root, Leaf, Flower, Fruit and Seed, and in every one of these parts, there is a peculiar Nature. The Operation is thus: Dig the Roots when they are full of juice, the Leaves when they are fresh and green, the Flowers when they are blown, the Fruit and Seeds in their due time. Extract the Spirits or Essences out of all these by Distillation, Maceration or Calcination, or any other of the former wayes. But when they are all extracted severally, one in the form of Oyl, another of Salt or Liquor; then mix them all together, so that they may be conjoyned and united in one body, which is called a Clyssus. Some mix them in Distillation in Vessels made for the purpose in this manner: They put the Water, Salt and Oyl in three several Curbicles of equal height and bigness; and tying their three necks together, and put them into one common Head, which may be fit to receive them all, close them, lute them, and kindle the fire under. The heat will elevate the thinnest substance in all of them,

which will meet and mix in the Head, and run down by the Nose, or Spout, into the Receiver: so set them by for use. This Congregation of Essences, doth penetrate and search all the remote passages of the Body, and is very useful in Physick.

CHAP. XIX.

How to get Oyl out of Salts.

I Have declared many ways of extracting Oyl, now I will shew how to draw it out of Salts, that they may be more penetrative, and work more powerfully, which can be done no other way. They seem to have some kinde of fat in them, yet will not burn; so that it cannot be called a perfect Oyl.

How to extract Oyl of Tartar.

Burn the Tartar, and reduce it into a Salt, as I shewed before: then lay it on a Marble in a moyst place, and in a few days it will turn to Oyl, and run down into a dish, which you must set underneath to receive it. Thus you may easily make it into Salt: Beat the Tartar into Powder, and mix an equal quantity of Salt-Peter with it: when they are mixt in Iron Mortar, set them in the fire, until they be quite burned: grind the remaining Fœces, and dissolve them in a Lye, strain it, and let the Lye evaporate away, and the Salt will settle to the bottom: then boyl some Eggs hard, take out the yelks, and fill up their place with Salt, and in a little time it will dissolve into Oyl.

Oyl of Sal Sodæ.

Dissolve the Salt in Water, and strain it through a cloth, then dry it, lay it on a Marble, and set it in a moyst place, and it will run down in an Oyl. So

The famous Oyl of Talk

is extracted onely by the vehement heat of fire: yet I knew not at first what it was useful for. But I perceive it is much accounted of by women in their Fucus. Beat it into fine Powder in an Iron-Morter, and put it into a very strong thick Pot, fasten the cover on with wire, plaister it with Potters Clay, and set it in the Sun for three days: then thrust it into a Potters Furnace where the flames are most violent. After three or four days, take it out, break open the Pot; and if you finde it not sufficiently calcined, make it up, and set it in again. When it is burned perfectly white, lay it on a Marble, and place it in a moyst room, or in a hole dug in the earth: and there let it stand for a good while, until it dissolve into Oyl; then reserve it in a Glass-bottle. So also is made

Red Oyl of Sulphur.

Grinde live Sulphur into a small Powder, and mix it with an equal quantity of the former Oyl of Tartar: boyl it three hours in a Glass-bottle; and when it is dissolved, strain it through a Linnen-cloth into another Glass, and set it over a Gentle fire, till it thicken like clotted blood, and so dry. Then powder it, and lay it on a Marble in a moist Cellar; there it will dissolve, and run down into the under-placed dish. Set this Liquor, being first strained thorow a cloth in a Glass-bottle over warm Ashes, until the moysture be consumed, and there will remain a red Oyl of Sulphur.

Oyl of Myrrh.

Boyl some Eggs hard, cut them in the middle, take out the yelks, and fill their places with Myrrh, powdered and seirced: lay them in an earthen Pan upon long cross-sticks, that the Eggs may not imbibe the Oyl again, and shut them in a moist Cellar; so the Oyl will drop down into the Pan.

CHAP.

Chap. XX.
Of Aqua Fortis.

Now I will recite those Distillations, which draw out neither Water nor Oyl, but a middle between both: for the terrene parts are forced up, turned into Water by the vehemency of the fire: from whence they do acquire so great a heat, that corrode and burn most violently. They are extracted onely in *igne reverberationis*, and with great care and labour.

How to draw Aqua Fortis, *or Oyl, out of Salt.*

It is a piece of Art discovered to very few. Take Pit-Salt, put into a Glass-Retort, treble luted over, and dried: set it in *igne reverberationis*, where the flames do struggle most violently: the first time you will get but little moysture. Break the Retort, and remove the Fœces into another, and pour the extracted Water into them, and distill them again: the second time thou wilt get more. Do the same a third time, and so to the tenth, until the Salt be all turned into Liquor, which is a most precious Jewel and worth thy labor. Some quench hot Bricks in the liquified Salt, and then distil them with a most intense fire, as in Oyl of Bricks.

A Water for the Separation of Silver.

Take Salt-Peter and Alcm in equal quantity, beat them in a Morter, and put them into a Glass-Retort luted over three double: when it is well dried, set it in the circulating fire, that is, which is reverberated on the top and below too. Stop it close, and set a large Receiver under it: for if it be too narrow, the strong Spirits will break out with a great bounce, crack the Vessel, and frustrate your labour. Distil it six hours: if you calcine the Alome-fire, the VVater will be stronger.

A Water for Separation of Gold.

Mix with the equal parts of Salt-Peter and Alcm, as much Vitriol, and distil it, as before: there will proceed a VVater so strong, that it will even corrode the Tincture of Gold. Wherefore, if this seem too violent, take nine pounds of the former Salts; being dissolved in VVater, and two ounces of *Sal Ammoniacum*: when they are melted, set them two days in *Fimo*, and with hot Ashes you may distil a VVater that will corrode Gold. If you retur'd the VVater upon the Fœces, let them macerate and distil it again, the VVater will be much stronger.

How to purge the phlegm from these Waters,

without which they are of no force: cast a little Silver into a little of this VVater; which, being overcharged with phlegm, will not corrode it. But set it to heat over the fire, and it will presently do it: pour all this VVater into another Pot, and leave the Fœces behinde in the former: so the VVater will be clarified.

Oyl of Vitriol.

Dissolve Vitriol in an earthen Pan with a wide mouth; let the phlegm evaporate, then encrease the fire and burn it, till it be all red, and the fourth part be consumed. Put it into a Glass-Retort, luted all over thrice double, and well dried, and set in *igne reverberationis*, continually augmenting the fire, and continuing it for three days, until the Vessel melt, and an Oyl drop out without any VVater. Every three pounds will yield one ounce of Oyl. Put it into a Glass-bottle, and set it in hot Embers that the VVater, if any be in the Oyl, may evaporate; for so it will be of greater strength. The sign of a perfect extraction, is, if it make a piece of VVood, being cast into it, smoak, as if it burned it.

Oyl of Sulphur.

This

This is the proper way to extract Oyl of Sulphur: Take a Glass with a large mouth in the form of a Bell, and hang it up by a wire: place a large Receiver under it, that it may catch the Oyl, as it droppeth out of the Bell. In the middle between these, hang an earthen Vessel full of Sulphur: kindle the fire, and make the Sulphur burn; the smoak of which, ascendeth up into the Bell, condenseth it self, and falls down in an oyly substance. When the Sulphur is consumed, put in more, until you have the quantity of Oyl which you desire. There is also another way to extract it in a greater quantity: Prepare a great Glass-Receiver, such as I described in the Extraction of Oyl of Tartar, and *Aqua Fortis*: cut a hole thorow it with an Emerauld, and indent the edges of it, that the smoak may pass out: set this upon an earthen Pan, in which you burn the Sulphur. Above this, set another Vessel of a larger size, so that it may be about a handful distant from the first: cut the edges of the hole in deeper notches, that the vapor ascending thorow the first, and circulating about the second, may distil out of both; so you may add a third and fourth. Pour this Oyl into another Glass, and let the phlegm evaporate over hot Embers; it will become of that strength, that it will dissolve Silver: and I may say, Gold also, if it be rightly made. The fume of Sulphur is congealed in *Sal Ammoniacum*: for I have gathered it in the Mountains of Campania, and condensed it into Salt, nothing at all differing from that which is brought out of the Eastern Countries. Thus *Sal Ammoniacus*, which hath so long lain unknown, is discovered in our own Country, and is nothing but Salt of Sulphur; and this Oyl is the Water of *Sal Ammoniac*, or Salt of Sulphur. I would fain know how Learned Men do approve this my Invention. I take the Earth, thorow which the smoak of Sulphur hath arisen, and dissolve it in warm Water, and purge it thorow a hanging Receptacle described before: then I make the Water evaporate; and so finde a Salt nothing different, as I hope, from Ammoniacum.

CHAP. XXI.

Of the Separation of the Elements.

IN every Compound, there are four Elements; but for the most part, one is predominant, the rest are dull and unprofitable. Hence, when we speak of separating the Elements of a Compound, we mean the separating that predominant one. In the Water-Lilly, the Element of Water is chief; Air, Earth and Fire are in it, but in a small proportion. Hence there is but a small quantity of heat and driness in it, because VVater overwhelms them all. The same must be understood in other things also. But do not think, that we intend by the separation of the Elements, to divide them absolutely, the Air from the VVater, and the VVater from the Fire and Earth; but onely by a certain similitude, as what is hotter then the rest, we call Fire; the moister, VVater. Stones participate more of Earth; VVoods, of Fire; Herbs, of VVater. VVe account those Airy, which fill the Vessels and Receivers, and easily burst them, and so flie out. VVhen the Elements are thus separated, they may afterwards be purified and attenuated. The manner of extracting them, is various according to the diversity of natural things; for some must be calcined: some sublimated, others distilled. I will set down some examples.

How to separate the Elements of Metals.

Lay your Metal in *Aqua Fortis*, as I shewed before, till it be dissolved: then draw out the *Aqua Fortis* by a Bath, and pour it on again, and so again, until it be turned into an Oyl of a light Red, or Ruby-colour. Pour two parts of *Aqua Fortis* unto the Oyl, and macerate them in a Glass in *Fimo* for a month: then distil them on Embers till the VVater be all drawn out, which you must take and still again in Balneo, until it ascend; so will you have two Elements. By the Bath the

Air

Air is elevated; the VVater and Earth remain in the bottom: the Fire continueth in the bottom of the former Vessel; for it is of a fiery substance: this, Nature, and the Affusion of Water, and the Distillation in Balneo will reduce into an Oyl again: in which you must correct the Fire, and it will be perfect. You may lay Metal in Embers, then by degrees encrease the fire: the VVater will first gently ascend, next the Earth. In Silver, the first Oyl is blewish, and in perfect separation, settleth to the bottom, and the VVater ascendeth; but in Balneo, the Elements of Fire and Earth: for the substance of it is cold and moist: in Balneo the Elements of Fire and Earth remain; first the Earth will come out, afterwards the Fire. So of Tin, the first Oyl is yellow; in Balneo, the Air will remain in the bottom, the Fire, Earth and VVater will ascend: which is proper onely to Tin; for in no other Metal, the Air remaineth last; but in Tin, the VVater is first elevated; next the Fire; last of all, the Earth. Of Iron is made a dark ruddish Oyl; Of Quicksilver, a white Oyl: the Fire settleth to the bottom: the Earth and Water are elevated: and so of the rest.

How to separate the Elements in Herbs.

In Herbs there is alwayes one Element which reigneth in chief. Take the Leaves of Sage, bruise them, macerate them in *Fimo*, and then distil them: the Fire will first ascend, until the colours be changed; next the VVater; then a part of the Earth: the other part will remain in the bottom, not being volatile, but fixed. Set the VVater in the Sun six dayes, then put it in Balneo: the VVater will ascend first, then the colour will alter; and the Fire ascendeth next, till the taste be changed: at length, a part of the Earth, the rest being mix'd with the Air, tarrieth behinde in the Bottom. In VVater-Plants, the Air ariseth first; next the VVater and Fire.

How to finde out the Vertues of Plants.

There are no surer Searchers out of the Vertues of the Plants, then our Hands and Eyes: the Taste is more fallible: for, if in Distillation, the hottest parts evaporate first, we may conclude, that it consisteth of hot and thin parts: and so of the rest. You may easily know by the separation of the Elements, whether a Plant have more of Fire, or VVater, or Earth, by weighing the Plant first: then afterward, when the VVater and Oyl are extracted, weighing the Fæces, and by their proportion you may judge of the degrees of each Element in the Composition of it, and from thence of their Qualities. But the narrow limits of this Book will not give me leave to expatiate farther on this Subject. Wherefore I will leave the Discourse of it to a particular Treatise, which I intend to set out at large on this matter.

How to extract Gum out of Plants.

There are some Plants out of which we may extract Gum: some Plants, I say, because many have none in them, and nothing can give more then it hath. Fennel, and all other kindes of it, Opoponax, and such-like Herbs are full of it. Nature is the best Director in extracting them: for when the Sun shines very hot, and the Stalks of these Plants are swelled with sap, by reason of the continual encrease of their juice; they open themselves in little clefts, like a Woman when her labour approacheth; and thence doth the Plant bring forth, as it were in travel, that Noble Licuor, which partly by the heat of the Sun, partly by a natural Inclination grows clammy, and is condensed into a hard Body. Hence we may learn

How to extract Gum out of Opoponax.

In the Summer Solstice gather the Roots in the night-time, that the heat of the Sun may not exhaust their moysture; slice it long wayes, and put it into a well vernished earthen Pipkin: then set it upside down in a descending Furnace with a Receiver under-

underneath, to catch the falling-Liquor: make a Fire about the upper part of the Vessel, which will drive down a Noble Gum, which must be purged in other Vessels, and may be meliorated by Distillation. The same may be effected on Sagapene, whose Roots must be gathered at the same time, and sliced; and being put into a Vessel with a gentle fire, will drop out a glutinous Liquor into the Receiver; which, being clarified, will harden like Gum, and is kept for Medicinal uses.

How to extract Gum out of Fennel.

Gather the stalks of Fennel, when it is in its vigor, and the Flowers begin to blow, about the full of the Moon; for then they are more succulent: slice them into pieces of a hand-long, and put them into a Glass-Tub of a hand in wideness, and a handful and a half in length: fill it full, and set the bottom of it, being full of little holes, into a Tunnel fit to receive it, and the lower part of the Tunnel into a Receiver. Then make a gentle fire about the Tub at a handful distance, which may beat upon the stalkes on every side with its heat, like the Sun-beams. The Tub thus growing hot, will exclude some drops; which, flying from the violence of the heat, slide down thorow the holes of the bottom into the Tunnel, and from thence into the Receiver, where they will condense into Gum, participating of the Nature of Fennel, of no contemptible vertues.

THE

THE ELEVENTH BOOK OF Natural Magick:

Of Perfuming.

The Proeme.

After Distillation, we proceed to Unguents and sweet smells: it is an Art next of kin to the other; for it provides odors of the same things, compounds and mingles Unguents, that they may send forth pleasant sents every way, very far. This Art is Noble, and much set by, by Kings and great Men. For it teacheth to make Waters, Oyls, Powders, Marchpanes, Fumes; and to make sweet Skins that shall hold their sent a long time; and may be bought for little money: not the common and ordinary way, but such as are rare, and known to very few.

Chap. I.

Of perfuming Waters.

I Have in the former Book shewed how sweet Waters may be distilled out of Flowers and other things, as the place dedicated to Distillation did require: here now I will teach how to compound sweet Waters and Flowers, that may cast forth odoriferous sents: as first,

To make a most sweet perfumed Water.

Take three pound of Dama k Ro'es, as much of Musk and Red-Roses, two of the Flowers of Orange, as many of Myrtle, half a pound of Garden-Claver, an ounce and a half of Cloves, three Nutmegs, ten Lillies: put all these in an Alimbeck, in the nose of which you must fasten of Musk three parts, of Amber one, of Civet half a one, tied up together in a clout: and put the Nose into the Receiver, and tie them close with a cloth dip'd in Bran and the white of an Egg mixed: set a gentle fire under it, until it be all distilled.

Another.

Take two pound of Rose-water, of Lavender half one, of Cretan-Wine thirteen drachms; of the Flowers of Gilliflowers, Roses, Rosemary, Jasmine, the Leaves of Marjoram, wilde Betony, Savory, Fennel, and Basil gentle, half a pound; an ounce of Lemmon-peel, a drachm of Cinnamon, Benjamin, Storax and Nutmegs: mix them, and put them in a Glass, and set them out in the Sun for four dayes; then distil them with a gentle fire: and unless you put Musk in the Nose of the Alimbeck, tie it up in a rag, hang it by a thread in the Water, whilst it standeth sunning for a month. Set it in the Sun, to take away the scurvy savor of the distilling, if by chance it conceive any.

Aqua Nansa.

Take four pound of Rose-water, two of Orange-Flowers, one of Myrtle, three ounces

ounces of sweet Trifoil, one of Lavender: add to these, two ounces of Benjamin, one of Storax, the quantity of a Bean of Labdanum, as much Mace and Cloves, a drachm of Cinnamon, Sanders, and Lignum Aloes, an ounce of Spikenard: let these all be grosly beaten, and boyled in a vernished earthen Pipkin over a gentle fire, for the space of an hour; then let them cool. Strain them through a Linen-cloth, and set it up in a Glass close stopt. But tye up the Cinnamon, Cloves, Lignum Aloes and Sanders in a thin Linen-cloth; and so put them into the pot, and boyl them, as I said before, and afterwards take out the bundle: for after the boyling of the water, the remaining dust may be formed into Pills, and made into Cakes, which may be used in perfuming, as I shall teach hereafter. This Water is made divers ways, but I have set down the best: yet in the boyling, it will turn coloured, and become red, so that Hankerchiefs or white Linen, if they be wetted in it, are stained, although they are made wonderfully sweet: which maketh many forbear the use of it. Wherefore, if we would have

Aqua Nansa clarified,

Take the former Water, and put it into a Glass-Retort, and set it in Balneo, over a gentle fire: the VVater will become clear, and almost of the same sent: onely a little weaker: keep the Water, and lay aside the rest of the Fæces for sweet Cakes.

CHAP. II.

To make sweet Water by Infusion.

NOw I will teach how to make perfumed Liquors, and what Liquors they are, which will receive odors best; for VVater is unapt to keep sent, Oyl is better, and VVine, (we may assign the reason out of *Theophrastus*: for VVater is thin, void of taste or sent, and so fine, that it can gather no sent) and those Liquors which are thick, savory, and have a strong sent. VVine, although it be not sweet of it self, yet being placed nigh any odour, it will draw it, because it is full of heat, which doth attract. VVater, being cold by Nature, can neither attract, nor receive, nor keep any sent: for it is so fine, slender and thin, that the odour flieth out again, and vanisheth away, as if there were no foundation whereon it could fix and settle, as there is in VVine and Oyl, who are more tenacious of sent, because they are of a denser and callous Body. Oyl is the best preserver and keeper of sent, because it is not changeable: wherefore Perfumers steep their perfumes in Oyl, that it may suck out their sweetness. We use Wine to extract the sent of Flowers, and especially, *Aqua Vitæ*; for Wine, unless distilled, infecteth the Water too much with his own sent.

Musk Water.

This VVater setteth off all others, and maketh them richer; wherefore it is first to be made. Take the best *Aqua Vitæ*, and put into it some Grains of Musk, Amber and Civet, and set them in the hot Sun for some dayes: but stop the Vessel very close, and lute it; for that will very much add to the frangrancy of it. A drop of this put into any other water, will presently make it smell most pleasantly of Musk. You may do the same with Rose-water and Fountain-water often distilled, that it may obtain a thinness and heat, which is very necessary for the extraction of Essences.

Water of Jasmine, Musk-Roses, Gilliflowers, Violets and Lillies,

is extracted the same way: for these Flowers send forth but a thin odour, which dwelleth not in the substance of them, but onely lieth scattered on the superficies; so that if they remain too long on the fire, or in their Menstruum, their sweetness degenerateth from its former pleasantness, and is washed off by the mixture of the stinking ill-savoured part of their substance. VVherefore we must lay their Leaves onely

onely in the best *Aqua Vitæ*, that is, the Leaves of Lillies, Jasmine, Musk-Roses, and the rest; hanging them on a threed, that when the VVater hath sucked out their odour, we may pluck them out, because their odour lieth onely on their superficies; so that if they should remain long in the *Aqua Vitæ*, it would penetrate too deep into them, and draw out a sent, which would not onely destroy their former sweetness, but taint them with an ill savour, which accompanieth those inward parts. After these Leaves are taken out, supply them with fresh, until you perceive their sent is also extracted. But take out the Violets and the Gilliflowers sooner then the rest, lest they colour the VVater. This VVater, being mixt with others, taketh away the scurvy sent of the VVine.

A sweet compounded Water.

Take a great Glass-Receiver, and fill the third part almost of it with *Aqua Vitæ*: put into it Lavender-Flowers, Jasmine, Roses, Orange and Lemmon-Flowers. Then add Roots of Iris, Cypress Sanders, Cinnamon, Storax, Labdanum, Cloves, Nutmegs, Calamus Aromaticus, with a little Musk, Amber, and Civet. Fill the Glass, and stop it well. But after you have filled the Glass with the Flowers, they will wither and sink down: wherefore fill it up with more. Set it in a very hot Sun or in Balneo, until their sweetness be all extracted. Then strain out the Water; and one drop of it in Rose-water, or of Myrtle-Flowers, will perfume it all with a most fragrant smell.

Chap. III.
How to make sweet Oyls.

HOw to extract Oyl out of Spices and sweet things, is declared before: now I will shew how to draw sents out of other things with Oyl: or, as I said before, to make Oyl the ground in which odours may be kept and preserved a long time; which is done either by imbibing the Oyl with odors, or the Almonds out of which we afterwards express the Oyl.

How to make Oyl of Ben,

which is the sweetest Oyl of all, used by the Genois: take an ounce of Ben, a drachm of Amber, as much Musk, half a drachm of Civet: put them in a Glass-bottle well stopt, and set it in the Sun for twenty days; then you may use it. But be sure that it be close stopt: for the Nature of odors being volatile and fugitive, it quickly decayeth, loseth his fragrancy, and smelleth dully.

A way to make odoriferous Oyl of Flowers:

it is a common thing, but very commodious for Perfumers, and may be used for other things: he that knoweth how to use it rightly and properly, will finde it an Oyl very profitable to him. Blanch your Almonds, and bruise them, and lay them between two rows of Flowers. When the Flowers have lost their sent, and fade, remove them, and add fresh ones. Do this so long as the Flowers are in season: when they are past, squeeze out the Oyl with a press, and it will be most odoriferous. You may draw a sent with this way, out of those Flowers, from whom you cannot draw sweet Water. Oyl of Jasmine, Violets, Musk-Roses, Lillies, Crows-foot, Gilliflowers, Roses, and Orange-Flowers, and of others, being made this way, smelleth most fragrantly. Oyl of Amber, Musk, and Civet, may be thus made also: Cut the Almonds, being blanched from the top to the bottom, into seven or eight slices, and enclose them in a Leaden Box with these perfumes for six days, until they have imbibed the sent: then press them, and they will yield a most sweet Oyl; and yet perhaps not make the Musk much worse.

CHAP. IV.

How to extract Water and Oyl out of sweet Gums by Infusion.

VVE may extract sweet VVaters by another Art that we spoke of before, out of Gums, by Infusion and Expression: as for example.

A sweet Water of Storax, Benjamin, and Labdanum,

which affordeth a most sweet savour, and is thus extracted. Infuse Storax or Benjamin being bruised, in as much Rose-water as will cover them two fingers over: set them in Balneo, or a warm place for a week: then distil them in Balneo, and you will have a very pleasant Water from them, which you must expose to the hot Sun, that if there should remain any stink of the smoak in it, it may be taken away. We may also put Gums into Glass-Vessels, and make a slow fire under it: there will sweat out a very little water, but of sweet savour, and the Gum will settle to the bottom, which will be useful for other things.

To extract Oyl of Benjamin, Storax, and other things.

We may do this, by beating and mixing these Gums with Oyl of Almonds or of Ben, and macerating them in Balneo for a month: then draw out the Oyl either by a Retort or by Expression, which is better; it will yield a most fragrant odour, that you can hardly perceive whether it were drawn out of the Gums themselves by a Retort. Ben, called in Latine *Glans Unguentaria*, is used in precious Oyntments in stead of Oyl. *Pliny* calleth it Morobolane. So also *Martial*,

What not in Virgil *nor in* Homer*'s found,*
Is of sweet Oyl and Acorn the compound.

It is without any sent, and therefore fitter to receive them; and when it doth receive them, to reserve them, for it never groweth rank.

CHAP. V.

How to perfume Skins.

NOw we will discourse of the perfuming of Skins, which is performed several ways, either by sweet Waters, or rubbing them with Oyls, or laying them in Flowers, so that they may attract their odor. And first,

How to wash Skins,

that they may lose the sent of the Beasts and of Flesh. The manner is this: First wash them in Greek-Wine, and let them lie wet for some hours: then dry them, and if the sent continueth in them still, wash them again: that being taken away, wash them in sweet Waters. Take four parts of Rose-water, three of Myrtle, of Orange-Flowers two, of sweet Trifoli one, of Lavender half one: mix them, and put them into a wide mouthed earthen Vessel, and steep the Skins in them for a day. Then take them out, and hang them up in the shade to dry: but when they are almost dry, stretch and smooth them with your hands, that they may not be wrinkled. Do this thrice over, till they savour of the sweet Waters, and lose their own stink. Next

How to perfume Skins with Flowers.

They must first be rub'd over with Oyl; for, as I have told you, that is the foundation of all sents, both to attract them, and retain them in a greasie body. It may be done with common Oyl, but better with Oyl of Ben, because it is without any sent of his own: best of all with the Oyl of Eggs, which I have taught before how to make. The manner is thus: Anoynt your Gloves or Skins with a Spunge on the inward side, and

and especially, in the Seams: when that is done, you may thus make them attract the sent of any Flowers. Violets and Gilliflowers blow first in the Spring; gather them in the morning, and lay them on both sides of your Skins for a day. When they grow dry sooner or later, fling them away, and lay on new; stirring or moving them thrice or four times in a day, lest they make the Skins damp, and grow musty. When these Flowers are past, lay on Orange-flowers and Roses in the same manner: and last of all, Jasmine, which will continue until Winter: I mean, Garden-Jasmine, for it flourisheth two or three months. Thus your Skins or Gloves will become very sweet in a yeers space. The odour will quickly fade and die: but if you do the same the second time, it will continue much longer, and preserve their pleasantness. It very much preserveth their fragrancy, to keep them in a close place, in either a Wooden or Leaden Box: but if you lay them among Linen, it will suck out their odour, and dull their sent.

How to perfume Skins.

If you add Musk, Amber, and Civet to the aforesaid Skins, they will smell much more sweet and gratefully. Or take four parts of Western Balsam, one of Musk, as much Amber, and rub it on your Gloves with a Spunge, and they will smell very sweet. I will add one more excellent Composition: Take eight parts of Iris, one of Sander, two of Benjamin, four of Rose-Powder, one and a half of Lignum Aloes, half a one of Cinnamon, or rather less; soften them all with Rose-water and Gum-Tragacanth, and grinde them on a Porphyretick Marble: then anoynt your Gloves with it in a Spunge, and take three Grains of Musk, two of Amber, one of Civet: mingle them, and rub them also on.

How to take the sent out of Gloves.

If you repent your self of perfuming them, or would make sport with any one, boyl a little Rose-water or *Aqua Vitæ*; and while they be hot, put the Gloves in, and let them remain there awhile. This will take away their sent: and if you steep other Gloves in it, and dry them, they will imbibe it.

Chap. VI.

How to make sweet Powders.

Now we come to making sweet Powders, which are either Simple or Compound: they are used in stuffing sweet Bags, in perfuming Skins and Compositions. Learn therefore

How to make Cyprian Powder.

Take Moss of the Oak, which smelleth like Musk; gather it clean, in December, January, or February: wash it five or six times in sweet Water, that it may be very clean: then lay it in the Sun, and dry it. Afterwards, Steep it in Rose-water for two dayes, and dry it in the Sun again. This you must iterate oftentimes; for the more you wash it, the sweeter it will smell. When it is dried, grinde it into Powder in a Brass-Morter, and seirce it: then put it into the ceive, and cover it: make a fire, and set some sweet waters to boyl over it; or cast on some perfumed Cakes, and let the fume arise up into the ceive. The more often you do this, the stronger and more lasting sent will be imbibed by the Powder. When you perceive it to have attained a sufficient odour, take one pound of the Powder, a little Musk and Civet powdered, and a sufficient quantity of Sanders and Roses: beat them in a Brass-Morter; first putting in the Musk, and then by degrees casting in the Powder; so mingle them well. At last, put the Powders into a Glass close stopt, that the sent may not transpire and grow dull. There are several Compositions of this Powder, which would be too tedious to recount. It may be made, either white, or black, or brown. The white is made of Crude Parget washed in Rose-water, or other sweet Water; and adding Musk, Amber, Civet, and such-like, it will smell at a good distance.

CHAP. VII.

How to make sweet Compounds.

THere may be made divers kindes of sweet Compounds; of which are made Beads, which some use to reckon their Prayers by, and others to trim their clothes with: also wash-Balls to cleanse and sweeten the hands. And first,

How to make sweet Balls

with small charge, which yet shall seem to be very costly and sweet. Take one ounce of Cyprian Powder, and Benjamin of the best mixture, which is brought out of Turky; half an ounce of Cloves, a sufficient quantity of Illyrian Iris. First, melt some Gum Tragacantha in Rose-water: then with the former powder make it into a Mass, and rowl it up in little Balls: bore them thorow, and fix every one on a several tent upon the Table: then take four Grains of Musk, dissolve it in Rose-water, and wash the outside of the Balls with it: then let them dry: afterwards wet them again, for three or four times; so will they cast forth a most pleasant sent round about, which they will not quickly lose. But if you would bestow more cost, and have a greater sent, I will shew

How to make them another way.

Take one ounce of Storax, of Amber half one, a fourth part of Labdanum cleansed, one drachm of Lignum-aloes and Cinnamon, an eighth part of Musk. Beat the Gum, Storax and Amber in a Brass Morter with an Iron Pestle, being both hot: when these are well mixed, cast in the other powders, and mix them all together: at last add the Musk; and before they grow cold, form what you please of them. I will add also

Another Compound,

very necessary in a time of Plague, which will not onely refresh the Brains with its sweet odour, but will preserve it against Infection: Take three ounces of Labdanum, as much Storax, one of Benjamin, an ounce and a half of Cloves, an ounce of Sanders, three of Champhire, one of Lignum Aloes, Calamus Aromaticus, and juice of Valerian, a drachm of Amber: mix all these in the juice of Balm, Rose-water, and Storax dissolved. But to wash the Face and Hands, I will set down a most Noble Composition.

Of washing Balls or Musk-Balls.

Take the fat of a Goat, and purifie it in this manner: Boyl a Lye with the Pills of Citron in a Brass Kettle; let the fat remain in it for an hour: then strain it thorow a Linen-cloth into cold water, and it will be purified. Make the Lye of two parts of the Ashes of the Cerus-Tree, one of Lime, and half a Porringer of Alom; mingle them, and put them in a wooden Bowl, with two holes in the bottom, stopt with Straw: then pour in water, that it may cover them three fingers over, and strain it out thorow the holes: when the first is run out, add another quantity of water, and so the third time, whilst the water doth receive any saltness. Keep these several runnings asunder, and add some of the second & third unto the first, while a new Egg will swim in it: for if it sink and go to the bottom, it will be too weak; therefore add some of the first running. If it swim on the top, and lie upon the surface of the Water, put in some of the second and third running, until it descend, so that scarce any part of it be seen above the Water. Heat twenty pound of this Water in a Brass Kettle, and put into it two of the fat: then strain it out into broad Platters, and expose it to the hot Sun, mixing it often every day. When it is grown hard, make Pomanders of it, and reserve them. You may thus perfume them: Put two pound of the Pomanders into a Bowl, and with a VVooden Spoon, mix it with Rose-water, till it be very soft: when it hath stood still a while, and is grown hard, add more water, and

set

set it in the Sun: do this for ten days. Then take half a drachm of Musk, somewhat less Civet, and as much of Cinnamon well beaten: mix them, and if you add a little Rose-powder, it will smell much sweeter: then judge of it by your nose. If the sent be too weak, add more of the Perfumes; if too strong, more of the Soap.

How to make Soap, and multiply it.

Since we are fallen upon the discourse of Soap, we will not pass it over this: Take Soap Geta, and reduce it into a small Powder: set it on the fire in a Brass Kettle full of Lye of a moderate strength; so that in three hundred pound of Lye, you may put fourscore of Soap. When the Water beginneth to boyl up in bubbles, stir it with a wooden Ladle; and if the Lye do fail in the boyling, add new. When the Water is evaporated, take the Kettle from the fire, and cast in six pound of ordinary Salt well beaten; and with an Iron Ladle empty it out, and let it cool all night. In the mean time, prepare a brine, so sharp that it will bear an Egg. In the morning, cut the Soap into slices, and put it into a broad Vessel, and pour the brine on it: there let it stand one quarter of a day, and it will become very hard. If you put some *Sal Alchali* into the brine, it will make it much harder.

Chap. VIII.

How to make sweet Perfumes.

It remaineth, that we speak of Perfumes; for they are very necessary for the senting of Skins, Clothes, and Powders, and to enrich Noble mens Chambers, with sweet odors in Winter: they are made either of Waters or Powders.

How to make Perfumes of Waters.

Take four parts of Storax, three of Benjamin; of Labdanum, Lignum Aloes, and Cinnamon, one; an eighth part of Cloves, a little Musk and Amber. Beat them all grosly, and put them in a Brass Pot with an ounce and a half of Rose-water. Set the Pot over the fire, or hot Ashes, that it may be hot, but not boyl; it will cast forth a pleasant odor: when the Water is consumed, put in more. You may also add what you have reserved in the making *Aqua Nansa*: for it will send out a very sweet fume.

Another way.

Take three parts of Cloves, two of Benjamin, one of Lignum Aloes, as much Cinnamon, Orange-Pill and Sanders, an eighth part of Nutmeg. Beat them, and put them into a pot, and pour into them some Orange-flower-water, Lavender, and Myrtle-water, and so heat it.

Another way.

Express and strain the juice of Lemmon, into which put Storax, Camphire Lignum Aloes, and empty Musk-Cods: macerate them all in Balneo for a week in a Glass-Bottle close stopt. When you would perfume your Chamber, cast a drop of this Liquor into a Brass Pot full of Rose-water; and let it heat over warm Ashes, it will smell most pleasantly.

Excellent Pomanders for perfuming.

Take out of the Decoction for *Aqua Nansa*, Lignum Aloes, Sanders, Cinnamon and Cloves; and of the remaining Powders make a mass, which you may form into cakes, which being burnt on hot Ashes, smell very sweetly. I take out the Cinnamon and the Woods, because in burning they cast forth a stink of smoak.

Another way.

Take one pound and a half of the Coals of Willow, ground into dust, and seirced; four ounces of Labdanum, three drachms of Storax, two of Benjamin, one of Lignum

Lignum Aloes: mix the Storax, Benjamin, and Labdanum in a Brass Morter with an Iron Pestle heated, and put to them the Coal and Lignum Aloes powdered. Add to these half an ounce of liquid Storax: then dissolve Gum Tragacantha in Rose-water, and drop it by degrees into the Morter. When the powders are mixed into the form of an Unguent, you may make it up into the shape of Birds, or any other things, and dry them in the shade. You may wash them over with a little Musk and Amber upon a Pencil; and when you burn them, you will receive a most sweet fume from them.

Another Perfume.

Anoynt the Pill of Citron or Lemmon with a little Civet; stick it with Cloves and Races of Cinnamon: boyl it in Rose-water, and it will fill your chamber with an odorifeous fume.

CHAP. IX.

How to adulterate Musk.

THese Perfumes are often counterfeited by Impostors; wherefore I will declare how you may discern and beware of these Cheats: for you must not trust whole Musk-Cods of it, there being cunning Impostors, who fill them with other things, and onely mix Musk enough to give its sent to them. Black Musk inclining to a dark red, is counterfeited with Goats blood a little rosted, or toasted bread; so that three or four parts of them beaten with one of Musk, will hardly be discovered. The Imposture may be discerned onely thus: The Bread is easie to be crumb'd, and the Goats blood looketh clear and bright within when it is broken. It is counterfeited by others in this manner: Beat Nutmegs, Mace, Cinnamon, Cloves, Spikenard, of each one handful, and seirce them carefully: then mix them with the warm blood of Pigeons, and dry them in the Sun. Afterward beat them again, and wet them with Musk-water and Rose-water: dry them, beat them, and moysten them very many times; at length, add a fourth part of pure Musk, and mix them well, and wet them again with Rose-water and Musk-water: divide the Mass into several parts, and rowl them in the hair of a Goat which groweth under his Tail. Others do it

Another way, and

mingle Storax, Labdanum, and Powder of Lignum Aloes: add to the Composition, Musk and Civet, and mingle all together with Rose-water. The Imposture is discovered by the easie dissolving of it in water; and it differeth in colour and sent. Others augment Musk by adding Roots of Angelica, which doth in some sort imitate the sent of Musk. So also they endeavour

To adulterate Civet

with the Gall of an Ox and Storax liquified and washed, or Cretan Honey. But if your Musk or Amber have lost their sent, thus you must do,

To make Musk recover its sent,

hang it in a Jakes and among stinks: for by striving against those ill savours, it exciteth its own vertue, reviveth, and recovereth its lost sent.

THE

THE TWELFTH BOOK OF Natural Magick:

Of Artificial Fires.

The Proeme.

Before I leave off to write of Fire, I shall treat of that dangerous Fire that works wonderful things, which the vulgar call Artificial Fire, which the Commanders of Armies and Generals, use lamentably in divers Artifices and monstrous Designs, to break open Walls and Cities, and totally to subvert them; and in Sea-fights, to the infinite ruine of mortal men; and whereby they oft-times frustrate the malicious enterprizes of their Enemies. The matter is very useful and wonderful, and there is nothing in the world that more frights and terrifies the mindes of men. God is coming to judge the world by Fire. I shall describe the mighty hot Fires of our Ancestors, which they used to besiege places with; and I shall add those that are of later Invention, that far exceed them: and lastly, I shall speak of those of our days. You have here the Compositions of terrible Gun-powder that makes a noise, and then of that which makes no noise: of Pipes that vomit forth deadly Fires, and of Fires that cannot be quenched, and that will rage under Water at the very bottom of it; Whereby the Seas rend asunder, as if they were undermined by the great violence of the flames striving against them, and are lifted up into the Air, that Ships are drawn by the monstrous Gulphs. Of Fire-Balls that flie with glittering Fire, and terrifie Troops of Horse-men, and overthrow them. So that we are come almost to eternal Fires.

Chap. I.

How divers ways to procure Fire may be prepared.

Vitruvius saith, That it fell out by accident, that sundry Trees, frequently moved with Windes and Tempests, the Bows of them rubbing one against another, and the parts smiting each other, and so being rarified, caused heat, and took fire, and flamed exceedingly. Wilde people that saw this, ran away. When the Fire was out, and they durst come neerer, and found it to be a great commodity for the Body of man, they preserved the Fire; and so they perceived that it afforded causes of civility, of conversing and talking together. *Pliny* saith, It was found out by Souldiers and Shepherds. In the Camp, those that keep watch, found this out for necessity; and so did Shepherds, because there is not always a Flint ready. *Theophrastus* teacheth what kindes of Wood are good for this purpose: and though the Auger and the handle are sometimes both made of one sort of Wood, yet it is so that one part acts and the other suffers; so that he thinks the one part should be of hard Wood, and the other of soft. Example:

Wood that by rubbing together will take Fire.

They are such as are very hot, as the Bay-Tree, the Buck-thorn, the Holm, the Piel-Tree: But *Mnestor* adds the Mulberry-Tree; and men conjecture so, because they

will presently blunt the Ax. Of all these they make the Auger, that by rubbing they may resist the more, and do the business more firmly; but the handle to receive them, is to be made of soft Wood, as the Ivy, the wilde Vine, and the like, being dried, and all moisture taken from them. The Olive is not fit, because it is full of fat matter, and too much moysture. But those are worst of all to make Fires, that grow in shady places. *Pliny* from him. One Wood is rub'd against another, and by rubbing takes Fire; some dry fuel, as Mushroomes or Leaves, easily receiving the Fire from them. But there is nothing better then the Ivy, that may be rubbed with the Bay-Tree, or this with that. Also the wilde Vine is good, which is another kinde of wilde Vine, and runs upon Trees as the Ivy doth. But I do it more conveniently thus: Rub one Bay-Tree against another, and rub lustily, for it will presently smoak, adding a little Brimstone: put your fuel neerer, or dry matter made of dry Toad-stools, or Leaves that are very fine, found about the Roots of Colts-foot; for they will soon take fire, and retain it. I have done the same with Ivy-wood cleansed from the Bark, and dried; and by rubbing one Reed against another; or, which is better, drawing a cord swiftly upon it. The West-Indians binde two dry sticks together, and they put a stick between them, which they turn about with their hands moved from them, and so they kindle fire. But since the minde of Man seldom rests in the thing once invented, but seeks for new Inventions, by mans industry there is found out

A stone that will raise Fire with any moysture.

The way to make it is thus: Take quick Brimstone, Salt-Peter refined, of each a like weight; Camphire the double weight to quick Lime; and beat them all in a Morter, till they be so fine that they will flie into the Air: binde them all fast together, wrapt in a Linen-clout, and put them into an earthen pot; let it be well stopt: lute it well with clay and straw, and let it dry in the Sun: then put them into a Potters Oven; and when the earthen Vessel is perfectly baked, they will grow together, and be hard as a Stone: take them out, and lay them up in a dry place for use. I went to try this in haste, and my experience failed me. I know certainly, that some of my Friends have done it: but the pot must not have any vent, for it will all burn away. Yet I have seen water cast upon quick Lime, and by putting Brimstone to it, it took Fire, and fired Gun-powder. This I can maintain.

CHAP. II.

Of the Compositions for Fire, that our Ancestors used.

BEfore I come to our Compositions for Fire-works, I shall set down those that our fore-Fathers used in Sea-fights, and in taking or defending of Cities. *Thucidides* saith, That those that besieged Platænenses, when Engines would do no good, they fell to Fire-works: for casting about the Walls bundles of stuff, and throwing in Fire, Brimstone and Pitch, they burnt the wall: whence arose such a flame, that until that time no man ever saw the like. *Heron* teacheth, That in burning of Walls, after you have made a hole thorow, you must put wood of the Pine-Tree under, and anoynt them with dry pitch, and powdered Brimstone together, with Tar or Oyl, and set this on fire. And elsewhere he teacheth to burn with a pot: Take an earthen Pitcher, and binde it about with plates of Iron on the outside, and let it be full of small coal: let there be a hole about the bottom to put in the Bellows: for when the coals take fire, by sprinkling on of vinegar, piss, or any other sharp matter, the Walls are broken. *Vegetius* teacheth what combustible matter must be used: and he useth burning Oyl, Hards, Brimstone, Bitumen. Burning Arrows are shot in Cross-bows into the Enemies Ships; and these, being smeered over with Wax, Pitch and Rosin, they quickly fire the Decks, with so many things that afford fuell to the Fire. I shall add

The Fire-Darts the Ancients used.

Ammianus Marcellinus described Fire-Darts, a kinde of Weapon made after such a fashion:

shion: It is an Arrow of Cane, joyned with many Irons between the Shaft and the Head, and they are made hollow after the fashion of a womans Distaff, wherewith Linen-threed is spun; in the midst of it, it hath many small holes, and in the very hollow of it, is put fire with some combustible matter, and so is it easily shot forth of a weak Bow: for a Bow that is strong, puts out the Fire; and there is no means to put it out, but by casting on Dust or Lees of Oyl. *Livy.* Some came with burning Torches, others carrying Tow, Pitch, and Fire-Darts; and the whole Army shined as if it were all in flames: but in the concave part of this Dart there was Glue and Fuel, for Fire not to be extinguished, of Colophonia, Brimstone, Salt-Peter, all mingled with Oyl of Bays. Others say, with Oyl of Peter, Ducks-grease, the Pith of the Reed of Ferula, Brimstone; and, as others think, with Oyl, Tallow, Colophonia, Camphire, Rosin, Tow. The old Warriors called this an incendiary composition. *Lucan* speaks of burning of Ships:

This plague to water is not constant,
For burning Torches, Oyl and Brimstone joyn'd,
Are cast abroad, and fuel was not scant:
The Ships do burn with Pitch or Wax combin'd.

And elsewhere,

He bids them shoot their Shafts into the Sails,
Besmeer'd with Pitch, and so he soon prevails:
The Fire straight doth burn what's made of Flax,
And so their Decks were fir'd by melting Wax;
And tops of Masts were burnt, and Sea-mens packs.

But in compositions for Arrows and Darts, that they might burn the more vehemently, they put melted Vernish, Printers Oyl, Petroleum, Turpentine, made up with the sharpest Vinegar, pressed close, and dried at the Sun, and wrap'd over with Tow, and with sharp Irons to defend it, wrought together like to a bottom of yarn: all which at last, only passing over one hole, are smeered over with Colophonia and Brimstone, after the manner that follows. But by the subtilty of the Greeks, there was invented

A Fire, called the Greek Fire.

To overcome the Ship presently, they boyl'd Willow-coals, Salt, Spirit of VVine, Brimstone, Pitch, with the yarn of the soft VVooll of Ethiopia, and Camphire; which, it is wonderful to speak, will burn alone in the water, consuming all matter. *Callimachus* the Architect, flying from Heliopolis, taught the Romans that thing first, and many of their Emperors did use that against their Enemies afterwards. *Leo* the Emperor, burnt with this kinde of Fire those of the East, that sail'd against Constantinople with 1800 Carvels. The same Emperor, shortly after, burnt with the same Fire 4000 Ships of the Enemy, and 350 in like manner. *Prometheus* found out, that Fire would keep a yeer in the Cane Ferula: wherefore *Martial* speaks of them thus;

Canes that the Masters love, but Boys do hate,
Are by Prometheus *gift held at great rate.*

CHAP. III.

Of the divers Compositions of Gun-powder.

WE should be ill spoken of, if, that treating of fiery Compositions, we should not first say something of that wonderful Gun-powder, that is the Author of so many wonderful things; for it is an ingredient in all mixtures, and all depends upon it: not that I have any minde to speak of it, because it is so common; but of such things that have some new or hidden secret in them. It is made of four parts of Salt-

Peter, Brimstone and VVillow-coals, of each one part. But the Salt-Peter must be refined from common Salt, the fat and earthly parts: for that is the Foundation and Basis of the rest. All of these must be well powdered and finely seirced, and perfectly mingled together. Therefore if you would have

Gun-powder that shall make a great noise, and do much service,

Put in more parts of Salt-Peter; namely, to one part of Brimstone, and one of Willow-coal, put in six or eight parts of Salt-Peter, but excellent well refined and mingled. For four parts of Salt-Peter well refined and mingled, will do more then ten parts of that which is fæculent, and ill mingled. From the Salt-Peter comes the force, the noise of the flame; for Brimstone it takes fire, and the sooner for the coal. But if one would have

Gun-powder that will shoot a Bullet without noise,

he must make weak the Salt-Peter, but with some fat substance; which is done by the Glew and Butter of Gold, by mingling them according to a certain and due proportion; and so it will shoot a Ball with very little or no noise; for you shall scarce hear it: and though the force be not so strong, yet it is but little less. I will not teach the way, lest wicked men should take occasion to do mischief by it.

CHAP. IV.
How Pipes may be made to cast out Fire.

THe same *Heron* bids the Souldiers when they scale the VValls, that they should set against the faces of their enemies that defend the Cities, such hand-Guns that they can turn, and that will throw fire a great way: for so they shall so terrifie those that defend the VValls, by these monstrous Engines that cast Fire-Balls at such great distance, and with such furious flames, that they will never endure to behold them, nor yet the Souldiers that mount up the VValls; but will quickly run away. Moreover, in fights at Sea, and amongst Horse-men, men of this later age make great use of them: for Horses are terrified with Fire, as Elephants were; and will easily run away, and break the ranks. VVhen *Antipater* besieged the Megarenses, and the Macedonians did fiercely lie upon them, the Megarenses first anoynted their Hogs with pitch, and set them on Fire, and so sent them out amongst their Enemies. The Hogs were mad at it, and ran furiously among the Troops of Elephants, and cried as they burned with the Fire; and, as so many Furies, they extreamly disordered the Elephants. But I shall describe

Rockets that cast Fire a great way.

Make a stick of three foot long, round on the outside, and with a Turners Instrument make it hollow within: let the hole in the middle be four fingers diameter, and the VVood a finger thick; but within let it be fenced with a thin Iron plate, and without with Iron-hoops, at the mouth, in the middle, and on the end; and let the Spaces between be fastned and joyned together with Iron-wires, lest by the violence of the flames, striving within, the Engine should break in pieces, and hurt our Friends. Fill the hollow hole with this composition: Gun-powder three parts, Colophonia, Tutia, Brimstone, half a part: but you must bruise your Brimstone and Colophonia very well, and sprinkle them with Linseed Oyl, and work them in your hands. Then try if your mixture will burn gently or fiercely: fill the space between the joynts in a Reed with powder; put Fire to it: if it burn vehemently, that it break the Cane, add to it Colophonia and Brimstone; but if mildly, then put more Powder into your Rocket, pressing it again with a sharp stick: then stop the mouth of it, being full, with a Linen-clout, wax and pitch, and cover it, that the Powder fall not out: and making a hole in the clout, fasten a Cotton-match to the mixture, that when necessity is, it may take fire. You shall learn shortly after to make the Match. This is called a simple Rocket.

How

How to make a Rocket armed.

This by a continual sending forth of Fire-balls and Leaden Bullets, and by the shooting off of Iron-guns, will strike thorow the faces of those that stand by. It is made of Turpentine-Rosin, liquid Pitch, Vernish, Frankincense and Campbire, equal parts; quick Brimstone a third part and half; two parts of Salt-Peter refined, three parts of *Aqua Fortis*, as much of Oyl of Peter and Gun-powder: pown them together, and make Fire-balls: put them into the hollow of the Pipe, that is broad enough to receive them. Put into the hollow part the first mixture, three fingers deep, and press it down: then put in the little Ball of Gun-powder onely, weighing one ounce, ready made: then put in again the first Powder: and do this by course one after another, till it be full; and stop the mouth, as I said. Some do not thrust down a Ball, but Hards wrap'd up in square pieces of Iron; and that is so pliable, that the first mixture can kindle the Gun-powder. Some put in with the Tow, Glass grosly powdered. Others, Salt and powder of Lead: for if the Lumps stick to Armour or Garments, you cannot put them out with water or any thing else till they be consumed. Some there are also that compass in the Rocket with Brass or Iron-Guns, and at the open passage of the Rocket, they put in Gun-powder; when fire comes at it, with terrible and frequent noises, they cast Leaden Bullets forth upon the standers by. I saw a Rocket of extraordinary largeness; it was ten foot long, and as wide as a mans head might go in: it was full of Fire-balls, Stones, and other matters, and put into a Gun, and bound to the lower part of the Cross-yard of a Ship, which was transported every way with cords, as the Souldiers would have it; and in Sea-fights was levelled against the Enemies Gallies, and destroyed them all almost. Yet I will not omit to relate how

A Brass-Gun once fired, may discharge ten times.

It is a new Invention, that a great Brass-Gun, or a hand-Gun, may discharge ten or more Bullets one after another without intermission. Make a dark Powder, such as I used in the precedent part, and fill it thus: First, put in a certain measure of Gun-powder, that being put in, may discharge the Ball: then put in the Ball, but a small one, that it may go in loosely, and that the powder put in upon it, may come to touch the Gun-powder: then pour in this dark powder two or three fingers depth: then put in your Gun-powder, and your Bullet: and thus in order, one after the other, until the Gun seems to be full to the very mouth. Lastly, pour in some of your dark clammy powder: and when you have levelled your Gun to the place appointed, put Fire to the mouth of it; for it will cast out the Bullets, and then Fire for so long time as a man may discharge a hand-Gun at divers shoots. And thus with one Brass-Gun you may discharge many times.

CHAP. V.

How Fire-Balls are made that are shot off in Brass-Guns.

NOw I will shew how to make some Pot-compositions of Fire-balls that are shot out of Brass-Guns; for divers uses: either to burn ships, or to give light to some men in the night, or at Solemnities to cast up into the Air, that they may seem to stream along like falling Stars.

Fire-balls flying in the Air,

that are made at Festival times. Grind one pound of Gun-powder, one third part of Salt-Peter, two ounces of Brimstone, and as much Colophonia: mingle all these; sow them up in Coffins made of thick Cloth in fashion of Balls, and put them into hollow half circles made in Wood, and strike them with a wooden Hammer that they may be hard as stones; then binde them about with cords, and dip them in Tar three or four times, they that may be well fenced about, lest being discharged by the violence of a Brass-Gun, they should break in pieces. Lastly, pierce them thrice thorow with a sharp stick in the centre, and fill them with Gun-powder, and dry them

to be sent aloft. When you would use them, raise your Brass-Guns, or more conveniently the but end of your Guns, and take the Ball in a pair of Iron Pinchers, and give Fire to the holes, that it may take: when your are certain that it is lighted, with your right hand cast it into the hollow of the Gun; and with your left, give fire to the lowest touch-hole of the Gun: when it is fired, it rebounds; and being carried up by force of the Fire, it seems to run up and down in the Air, as I often saw it at Rome, and prepared it. They are made also

Another way.

Take Sea-pitch three parts, Turpentine-Rosin two parts, as much Brimstone, one part Goats suet: powder what must be powdered; and melt in a Brass Vessel what will melt: put them together, and stir them with a wooden stick. Then cast in Hards of Hemp or Flax, so much as will drink up all the mixture: then take the Brass Kettle from the fire, and with your hands make Balls as big as you will, that they may be shot forth of Brass-guns; and before they grow hard, thrust them through with wooden sticks, making small holes: then put in Gun-powder broken with Brimstone, and rowl them about upon a Table strewed with Gun-powder, and through the holes fasten cotton Matches rolled in the Powder, as I shall shew: let these dry and grow hard in the Sun. The way to discharge them from a Brass Gun is this: Chuse such as are commonly called Petrils, that are fittest for this use. The weight of the Gun-powder to be put into the Vessel, must be one fifth part of the Ball, or a little more or less; for if you put in much, they are either cast down by the too great violence of the Fire, or else they are put out as they flie, and do not answer our expectation. The Powder being put into the Vessel, lay neither Hards nor Hemp upon it; but fit the Ball upon the Powder, that as that fires, it may fire the Ball, and send it forth. Here is a more noble Composition

Another way.

Take five parts of Gun-powder, three of Salt-Peter refined, Brimstone two, Colophonia one half part, beaten Glass, common Salt, of Oyl of Peter, and of Linseed Oyl, and refined *Aqua Vitæ* as much: powder what must be powdered, and pass it through a fine Cieve: then melt it in a new earthen pot with burning coals, without flame: let them not sparkle; for so the Composition may take fire. Then cast in the Powders, that they may incorporate well together: then make round Coffins of Linen cloth as I said, and fill them with the Gun-powder alone, and binde them with cords about: then wrap your Tow in the Composition, and make a Ball of the bigness you would have it; and if you will shoot it out of a Brass Gun, binde it the thicker with little cords: then pierce your Ball through in many places with wooden pricks, that they may come at the powder that lieth in the middle: then put cotton Match through, that when it flies in the Air so violently, they may preserve the fire. In another earthen Pot, melt Pine-Tree-Gum, Gun-powder and Brimstone, and dip in your Ball into that liquor, that it may be all over-cast with it. When you take it out, lift up your cotton Matches with a stick, and strew them with Gun-powder. This Ball will sorely punish the Enemies with a great noise, cracking and breaking asunder: the Fire cannot be put out: it will burn all kinde of Furniture, Garments and what else, till it be all consumed; for it will burn Armour so mightily, that unless they be taken off, they will burn the man.

CHAP. VI.

Of Compositions with burning Waters.

PHilosophers seeking the Reason of Waters that lie hid above and under the earth, and are always hot, they say, Bitumen is the cause thereof, which being once on fire, hath this property, that it will not only not be put out, but if you cast on water it will burn the more. The Mountain Chimæra burns always in Phaselis, both night and day. *Gnidius Ctesias* saith, The fire of it is kindled by water, and is put out with Earth

Earth or Hay. In the same Lycia, *Vulcan*'s Mountains, touched with a burning Torch, will so burn, that the very stones and sand in Rivers are consumed by them, and will burn in the midst of the waters; and that fire is maintained by water. The hollow Cave in Nymphæum foreshews terrible things to the men Apollonia: as *Theopompus* writes; it encreaseth by showres, and it casts forth Bitumen, that must be tempered with that Fountain that cannot be tasted, otherwise it is more weak then any Bitumen is. Now I shall search out the kindes of Bitumen. The first kinde is liquid, called Naphtha, we call it Oyl of Peter, which remains in stones and Kitram. This hath great affinity with Fire, and the fire will take hold of it every way at a great distance. So some say, That *Medea* burnt a whore, who, when she came to sacrifice at the Altar, the fire laid hold on her Garland. Another kinde is, that men call Maltha; for in the City of Comagenes Samosata, there is a Lake sends forth burning mud: when any solid thing toucheth it, it will stick to it; and being touch'd, it will follow him that runs from it. So they defended the Walls, when *Lucullus* besieged them, and the Soldier burned in his Armor. Waters do kindle it, and only Earth can quench it, as experience shews. Camphire is a kinde of it: as Bitumen, it draws fire to it and burns. Pissaphaltum is harder then Bitumen: both Amber and Jet are of this sort; but these burn more gently, and not so much in the waters. Moreover, in regard it burns in the Water, it is Brimstone; for no fatter thing is dug forth of the Earth. To maintain this fire, it self is sufficient: it neither burns in the waters, nor is it put out with water, nor doth it last long; but, joyn'd with Bitumen, the fire will last always, as we see in the Phlegrean Mountains at Puteoli: and as fire, if Oyl be cast in, burns the more; so when Bitumen is kindled, water cast on, makes the flame the greater. Wherefore I shall make use of those fires that burn in and above the waters. But I shall bring some examples how is made

A Ball that will burn under Water.

First prepare your Gun-Powder; for this must be one Ingredient in all Compositions, and gives force to the rest to burn vehemently. If it be in great corns, pown it well, and seirce it fine: to seven parts of this, add two parts of Colophonia, three of Salt-Peter, one of Brimstone: pown them all together, and mingle them; sprinkling on of Naphtha, or of liquid pitch Kitram; moystning them so long, until the powder pressed in your hand will stay together. When these are well mingled, make trial by them: if it burn too vehemently, add more Colophonia, Salt-Peter and Brimstone; but if but weakly, more Gun-powder. This mixture must be wrapt in straw or linen-rags, or put into coffins made of the same things; and binde it as close as you can with straw, or little cords round about: then dip it into scalding pitch, and so let it dry: then wrap it again with straw, and smeer it over with pitch, to keep it safe from water, and that it may not break asunder by the violence of the fire. When it is well dried, and a little hole made in it, put in Gun-powder, and put fire to it: and when it begins to burn, stay but very little, and cast it into the water. It will by its weight fall to the bottom, and the flames will strive with the water, and drive them far from it: so it will appear to burn above, and is obscured with a black smoak, that you will think you see the sulphureous waters at Puteoli burning there. Being then made lighter by many turnings and windings, it will seem to ascend to the superficies of the water; which is a most pleasant sight: for you will think that the water burns; and you shall see two contrary Elements fighting together, yet to unite friendly until the matter be spent. Others wrap in cloth nothing but Gun-powder a whole handful; and this they binde in with cords: then they dip it in melted scalding pitch, and bound very fast, and wrapt in many linen rags; they make a small hole through it, and they place this in the Centre of the Ball we even now spake of, that when it comes to the superficies of the water, the fire taking hold on the Powder within, breaks the Ball in pieces; and with a mighty noise, wounds all those that stand neer it. Some make it

Otherwise.

They make a Composition of Brimstone, Colophonia, Salt-Peter, Vernish; and to this they add a fourth part of Gun-powder; and they add Venice-

Tur-

Turpentine-Rosin, Oyl of liquid Vernish, Petroleum, Linseed Oyl, and the best refined *Aqua Vitæ*: with these they wet and sprinkle the dry Powders. I have seen this take fire more vehemently, and to cast the flames farther. To do

The same,

Take Mastick one part, Frankincense two, Grains of Vernish, Brimstone, Camphire, Gun-powder, of each three parts; of Colophonia six, Salt-Peter refined nine: pown them all together, and sift them; onely pown the Camphire mingled with the Salt; for that onely will not be powdered: strew them all about upon an earthen dish with a large mouth, and sprinkle them with Naphtha, or Vernish, or Linseed Oyl, and mingle them with your hands. Take out part of the Powder, and put it into a hollow Cane, and try it, whether it will burn to your minde; and if it burn too weak, put in more Gun-powder; if too vehemently, more Colophonia: always trying if it be as it should be. For to these Compositions, we add the same things to blunt the vehement burning of the Salt-Peter and the Gun-powder. Then make Coffins of Canvas, like Balls, and fill them with your Composition, and stuff it in well, and binde them well with cords round about. Then melt Brimstone, and let there be in it one fourth part of Gun-powder: stir them together with a wooden stick, and lute the Ball over with that liquor, that it may be well fenced and crusted. Then with a wooden prick make a hole in it in the middle to the Centre, and fill that with powder; and so put in fire, and it will burn under water: it may also be shot forth of brass Engines. I will shew you how to make

Balls and Pots to be cast forth of Ships.

The Ancients write, That *Alexander the Great* found out this Composition of Fires, to burn Bridges, Gates, Ships, and the like: but it will work now more vehemently, by reason of the Gun-powder added. Take Gun-powder, Salt-Peter, Brimstone, Pitch, Pine-Tree-Gum, Vernish in Grains, Frankincense, of each alike; Camphire one half: beat all these, and mingle them. Then take Oyl of Peter, liquid Vernish, Rosinous Turpentine, equal parts; and with these, being liquid, mingle all together, and fill Pots with them, to be cast among Ships and enemies: or, if you make a Ball of these, binde it hard about the head of a hammer, whose sharp-tooth'd end must be a foot long, and the handle three foot. If at a Sea-fight, any one with a light Boat strike this into a Ship of the enemies with one blow, he shall raise a mighty fire, that neither water nor any other thing will put out.

Chap. VII.

How Balls are made of Metals that will cast forth fire and Iron wedges.

I Shall shew you how to make brittle Balls of Metal, that being filled with Gun-powder, and all the places of vent stopt, with the violence of the flame will flie into many pieces, and strike through those they meet with, and on all sides they will pierce through those who are not onely unarmed but armed men; and these are to be used in besieging of Cities: for cast amongst multitudes, they will wound abundance. The danger is seen among Herds of Cattle. Make then

Balls that will cast pieces of Iron a great way off.

Let a Ball of Metal be made a hand-breadth diameter, half a finger thick: the Metal is made of Brass three parts, Tin one part, to make it so brittle, that by force of fire it may flie in small pieces. To make the Ball more easily, make it of two half circles, for the charge is the less, and let them joyn together like a box, or let them screw one within another: let it be equally thick, that it may break in all parts alike. Then with a Nail drove through the middle, let it be fastened the better together, a finger thick, that it may break in all parts before it do in the joynts. Then make a little Pipe as big as a finger, and as long as ones hand, that it may come to the Centre of the Ball, and so stick forth beyond the Superficies, like a Pyramis, the Basis outward, the Point inward: sodder it fast to the Ball.

The

The nail, as I said, must come forth on both sides; and to this fasten wires, that runs through iron piles, that have a large hole through them, that every wire may have thirty of them; that when the ball is broken by force of the fire, the wires of iron may break also, and the piles of iron may be thrown about, a great way, with such force, that they may seem to be shot forth of Guns and Ordnance. Lastly, let the Ball be filled with the best Gunpowder onely, but the pipe with that mixture that burns more gently, that when fire is put to it, you may hold it so long in your hand, until that slow composition may come to the centre; and then throw it amongst the enemies, for it will break in a thousand pieces; and the iron wires and pieces of iron, and parts of the Ball will fly far, and strike so violently, that they will go into planks or a wall a hand depth: These are cast in by Souldiers, when Cities are besiged, for one may wound two hundred men: and then it is worse to wound then to kill them, as experience in wars shews. But when you will fill the pipes, hold one in your hand without a Ball, full of the composition, and try it how long it will burn, that you may learn to know the time to cast them, lest you kill your self and your friends. I shall teach you how with the same Balls

Troops of Horsemen may be put into confusion.

There are made some of these sorts of Balls, that are greater, about a foot in bigness, bound with the same wire, but fuller of iron piles, namely with a thousand of them. These are cast amongst Troops of Horsemen, or into Cities besieged, or into ships with slings, or iron guns, which they call Petrels; and divers ways: for if they be armed with iron pieces, when they break they are cast forth so with the violence of the fire, that they will strike through armed men and horses, and so fright the horses with a huge noise, that they cannot be ruled by bridle nor spurs, but will break their ranks. They have four holes made through them, and they are filled with this said mixture, that being fired they may be cast amongst Troops of Horsemen; and they will cast their flames so far with a noise and cracking, that the flames will seem like to thunder and lightning.

Chap. VIII.

How in plain ground, and under waters, mines may be presently digged.

To dig Mines to overthrow Cities and Forts, there is required great cost, time, and pains, and they can hardly be made but the enemy will discover it: I shall shew how to make them in that champion ground, where both armies are to meet, with little labour, and in short time.

To make Mines in plain grounds where the Armies are to meet.

If you would do this in sight of the enemy (for they know not what you do) I shall first teach how. A little before night, or in the twilight, where the meeting shall be, or passage, or standing, there may pits be made of three foot depth, and the one pit may be distant from the other about ten foot: There fit your Balls about a foot in bigness, that you may fill the whole plain with them; then dig trenches from one to the other, that through them cotton matches may pass well through earthen pipes, or hollow canes; but fire the Balls at three or four places: then bury them, and make the ground even, leaving a space to give fire to them all at once. Then at the time of war, when the enemy stands upon the ground, then remove at your pleasure, or counterfeit that you fly from them; and cast in fire at the open place, and the whole ground will presently burn with fire, and make a cruel and terrible slaughter amongst them; for you shall see their limbs fly into the air, and others fall dead pierced through, burnt with the horrible flames thereof, that scarce one man shall scape. You shall make your Match thus: In a new Test let the best *Aqua vita* boyl with gunpowder, till it grow thick, and be like pap; put your matches into it, and role them in the mixture: take the Test from the fire, and strew on as much gunpowder as they will receive, and set them to dry in the Sun: put

this into a hollow cane, and fill it full of gunpowder: or take one part refined saltpeter, brimstone half as much, and let it boyl in a new earthen pot, with oyl of linseed: put in your Match, and wet them well all over with that liquor, take them away and dry them in the Sun. But if you will make

Mines under the Water,

use this rare invention: You shall make your Mines where the enemies Galleys or Ships come to ride; you shall upon a plain place fit many beams, or pieces of timber, fastned cross-wise, and thrust through, or like nets; according to the quantity in the divisions, you shall make fit circles of wood, and fasten them, and fill them with gunpowder; the beams must be made hollow, and be filled with match and powder, that you may set fire to the round circles: with great diligence and cunning, smeer over the circles and the beams with pitch, and cover them well with it, that the water may not enter, and the powder take wet (for so your labour will be lost) and you must leave a place to put fire in; then sink your engine with weights to the bottom of the water, and cover it with stones, mud and weeds, a little before the enemy come. Let a Scout keep watch, that when their Ships or Galleys ride over the place, that the snare is laid; for fire being put to it, the sea will part, and be cast up into the air, and drown'd the Ships, or will tear them in a thousand pieces, that there is nothing more wonderful to be seen or done. I have tried this in waters and ponds, and it performed more then I imagined it would.

Chap. IX.

What things are good to extinguish the fire.

I Have spoken of kindling fires, but now I shall shew how to quench them; and by the way, what things obnoxious to the fire, will endure it and remain. But first I will relate what our Ancestours have left concerning this business. *Vitruvius* saith, That the Larch-tree-wood will not burn, or kindle by it self, but like a stone in the furnace, will make no coles, but burn very slowly. He saith the reason is, That there is in it very little air or fire, but much water and earth, and that it is very solid, and hath no pores that the fire can enter at. He relates how this is known. When *Cæsar* commanded the Citizens about the Alps, to bring him in provision, those that were secure in a Castle of wood, refused to obey his commands: *Cæsar* bade make bundles of wood, and to light torches, and lay these to the Castle: when the matter took fire, the flame flew exceeding high, and he supposed the Castle would have fallen down; but when all was burnt, the Castle was not touched. Whence *Pliny* writes, The Larch-tree will neither burn to coles, nor is otherwise consumed by fire, then stones are. But this is most false: For seeing it is rosiny and oyly, it presently takes fire and burns, and being one fired, is hard to put out. Wherefore I admire, that this errour should spread so far, and that the Town Larignum, so called from the abundance of Larch-wood, compassed about with fire, should suffer no hurt. Moreover, I read that liquid Alom, as the Ancients report, will stand out against fire: For wood smeered with Alom, and Verdigrease, whether they be posts or beams, so they have a crust made about them, will not burn with fire. *Archelaus* the General, for *Mithridates* made trial of it in a wooden Tower against *Sylla*, which he attempted in vain to set on fire: which I find observed by *Quadrigarius*, in his Annals. But this liquid Alom is yet unknown to many learned men: our Alum wants this property. But many say, that vinegar prevails against fire. *Plutarch* saith, That nothing will sooner quench fire then vinegar: for of all things, it most puts out the flame, by its extreamity of cold. *Polianus* reports, *Athenales*, when he was besieged by his enemies, poured out of brazen vessels, melted lead upon the engines, that were set to scale the place, and by this were the engines dissolved; but the enemies poured vinegar upon it, and by that they quenched the lead, and all things else that fell from the walls: and so they found vinegar to be the fittest to quench fire, and an excellent experiment, if things be wet with it. *Pliny* prayseth

seth the white of an egge to quench it, saying, that the white of an egge is so strong, that if wood be wet with it, it will not burn, nor yet any garment. *Hieron*, to cover scaling engines, used the raw hides of beasts new killed, as having force to resist fire; and the joynts of wood they fenced with chalk, or with ashes tempered with blood, or clay molded with hair or straw, and with sea-weeds wet in vinegar; for so they were safe from fire. *Carchedonius* was the first that taught men to cover engins and rams, with green hides. I have heard by men of credit, that when houses were on fire, by a peculiar property, the menstruous clothes of a woman that had her courses the first time, cast over the planks, would presently put out the fire. Thick and muscilaginous juyces are good against fire, as of Marsh-mallows. Therefore *Albertus* writ not very absurdly, that if a man anoint his hands with juyce of Marsh-mallows, the white of an egge and vinegar, with alom,

He may handle fire without hurt.

And it is a thing that hath much truth in it. But I think that quick-silver killed in vinegar, and the white of an egge, and smeered on, can preserve any thing from fire.

Chap. X.
Of divers compositions for fire.

I Shall speak of divers compositions for fire to be used for divers uses. But men say *M. Gracchus* was Author of this invention.

To make a fiery composition, that the Sun may kindle.

It consists of these things: Oyl of Rosinous Turpentine, of Quick-silver (otherwise then I shewed in distilling) of Juniper, of Naphtha, Linseed, Colophonia, Camphire; let there be Pitch, Salt-peter, and Ducks-grease, double to them all; *Aqua vita* refined from all flegm. Pound them all, and mingle them; put them up in a glazed vessel, and let them ferment two moneths in horse-dung, always renewing the dung, and mingling them together. After the set time, put it into a retort, and distil it: thicken the liquor either with Pigeons-dung, finely sifted, or with gunpowder, that it may be like pap: Wood that is smeered over with this mixture, and set in the summer Sun, will fire of it self. Pigeons-dung easily takes fire by the Sun beams. *Galen* reports, That in Mysia, a part of Asia, a house was so set on fire. Pigeons-dung was cast forth, and touched a window that was neer; as it came to touch the wood that was newly smeered with rosin, when it was corrupted, and grew hot, and vapoured at Midsummer, by heat of the Sun, it fired the rosin, and the window; then other places smeered with Rosin, took fire, and by degrees part of the house began to take hold; and when once the covering of the house began to flame, it soon laid hold of the whole house, because it hath a mighty force to inflame all. Ducks-grease is very prevalent in fire-works, and Physitians praise it extremely, that it is most subtile, penetrating and hot, it makes other things penetrate; and as it is most subtile and hot, so it takes fire vehemently, and burns. I shall shew how to distil

A most scalding Oyl.

When I would prepare the most excellent compositions of burning oyl, I distilled common oyl in a retort, but with great labour; yet what was distilled was thin, combustible, and ready to fire; that once kindled, it was not to be put out; and it would draw the flame at a great distance, and hardly let it go. But oyl of Linseed is stronger than it; for if you distil it often, it will have such a wonderful force to take fire, that it can hardly be shut up in a vessel, but it will draw the fire to it: and the glass being opened, it is so thin, that it will fly into the Air; and if the light of a candle, or of fire touch it, the Air takes fire, and the oyl fired by it, will cast the flame afar off, so vehemently, that it is almost impossible to quench it. It must be distilled with great cunning, lest the vessel over-heat, it should take fire within. Moreover,

Fire that is quenched with oyl, is kindled with water.

It is thus made: I said that Naphtha will burn in water, and that Camphire is a kind of it. Wherefore, if you mingle brimstone with it, or other things, that will retain fire; if you cast in oyl or mud, it will quench it; but it revives and flames more, if you cast in water. *Livy* relates, That some old women in their plays, lighting Torches made of these things, passed over Tyber, that it seemed a miracle to the beholders. I said it was the property of Bitumen to take fire from water, and to be quenched with oyl. *Dioscorides* saith, That the Thracian stone is bred in a certain River of Scythia; the name of it is Pontus: it hath the Force of Jet, they say it is enflamed by water, and quenched with oyl, like as Bitumen. *Nicander* speaks of this stone thus:

If that the Thracian stone be burnt in fire,
And wet with water, the flame will aspire;
But oyl will quench it. Thracian shepherds bring
This stone from th' River Pontus, Poets sing.

Torches that will not be put out by the winds.

They are made with brimstone, for that is hardly put out, if once kindled. Wherefore Torches made with wax and brimstone, may be carried safely through winds and tempests. These are good for Armies to march by, or for other necessary things. Others use such: They boil the wick of the Torches in Salt-peter and water; when it is dried, they wet them with brimstone and *Aqua vitæ*: of this mixture then they make their Candles, with brimstone, and then with half Camphire, and Turpentine, two parts Colophonia, three of Wax; of this they make four Candles, and put them together: in the middle that is empty, they cast in quick-brimstone, and they will forcibly resist all things. Or thus: Boil wicks of Hemp or Cotton in water, with Salt-peter; take them out and dry them: then melt in a brass pot equal parts of brimstone, gunpowder, and wax; when they are melted, put in your wicks to drink up part of the mixture; take them out, and to what is left in the kettle, add Gunpowder, Brimstone, and Turpentine, of each a like quantity, of which mixture make your Torches, and joyn them together. Also there is made

A cord that set on fire, shall neither smoke nor smell.

When Souldiers or Hunters go secretly by day or night, they use sometimes to make a Match, that being lighted, will neither smell near hand, nor far off, nor make any smoke; for wild Beasts, if the Match smell, will sent it, and run to the tops of the Mountains. Take a new earthen pot, and put into it a new cord so handsomely, that the whole pot may be filled; so laid in rounds, that no more can go in; cover it, and lute it well three or four times, that it may have no vent; for the whole business depends on this. Then make a fire round about it, by degrees, that first it may grow hot, then very hot, and lastly red hot; and if sometimes the smoke come forth, stop the chinks with clay still; then heaped up under the coles, let it grow cold of it self; and opening the Pot, you shall finde the Cord black, like a cole. Light this Cord, and it will neither smoke nor smell.

CHAP. XI.

Fire-compositions for Festival days.

I Have shewed you Terrible and Monstrous fire-works, it is fit to shew you some to use at Solemn Times: not so much for use, as to give you occasion to find out higher matters. I shall shew then how to make one,

That when a man comes into his Chamber, the whole Air may take fire.

Take

Take a great quantity of the best refined *Aqua vitæ*, and put Camphire into it, cut small, for it will soon dissolve in it: when it is dissolved, shut the Windows and Chamber-doors, that the vapour that exhales, may not get forth: when the vessel is full with water, let it boil with coles, put under, without any flame, that all the water may resolve into smoke, and fill the Chamber, and it will be so thin, that you can scarce perceive it. Let some man enter into the Chamber with a lighted Candle in his hand, and the Air by the Candle light, will take fire all about, and the whole Chamber will be in a flame, like an Oven, and will much terrifie one that goes in. If you dissolve in the water a little Musk, or Amber-greese, after the flame you shall smell a curious sent. Also there is made

Exceeding burning water:

Thus: Take old strong black Wine, put into it quick Lime, Tartar, Salt, and quick-Brimstone; draw out the water of them with a glass retort. This will burn exceedingly, and never cease till it be all consumed. If you put it into a vessel with a very large mouth, and put flame neer it, it will presently take fire: if when it is on fire you cast it against a wall, or by night out at the window, you shall see the Air full of sparks, and kindled with fires. It will burn, held in your hands, and yet will not scald you. Distil it once again, and it will burn the less. But if you take equal parts of quick Lime, and Salt, and shall mingle them with common Oyl, and make little Balls, and cast them into the belly of the retort at the neck, and then shall draw forth the Oyl by a vehement fire; and mingling this Oyl again with Salt and quick Lime, shall distill them again, and shall do the same four times, an Oyl will come forth that will burn wonderfully, that some deservedly call it infernal Oyl. A Solemn Pleasant fire, is made for the Theater. If Camphire be dissolved in *Aqua vitæ*, and with that Fillets, Papers, or Parchments, be smeered; and being dried again, be lighted, and shall fall from a loft; as they fall lighted through the Air, you shall see Serpents with great delight. But if you desire

To cast flame a great way,

Do thus: Beat Colophonia, Frankincense, or Amber finely, and hold them in the palm of your hand, and put a lighted Candle between your fingers; and as you throw the Powder into the Air, let it pass through the flame of the Candle; for the flame will fly up high. If you will have that

Many Candles shall be lighted presently,

on Festival Days, as I hear they are wont to do amongst the Turks: You shall boil Brimstone and Orpiment with Oyl, and in them let thred boil; when it is dry, bind it to the wicks of Candles, and let them pass through; for when one head is lighted, the flame will run to them all, and set them on fire. Some call it *Hermes* his Oyntment. Any man may

Eating in the dark, cast sparkles out of his mouth.

It is pleasant for the Spectators; and it is thus: Let a man eat Sugar-candy, for as he breaks it with his teeth, sparkles will seem to fly out of his mouth; as if one should rub a fire-brand.

Chap. XII.

Of some Experiments of Fires.

I Will set down some Experiments, that are without the ranks of the rest. I held it better to conceal them: but they may give you occasion to think on greater matters by them. If you will

That Bullets from Brass Guns, may enter deeper,

you may easily try this against a wall, or plank set up. Let the Ball rather go into the

the hollow of it, streight, then wide: but wet it in Oyl, before you put it in, and so cast it in: this Bullet shot off by force of fire, will go in twice as far as otherwise. The reason is easie: for the Oyl takes away the occasion of the Airs breathing forth; for all vents being stopt, the flames striving within, cast forth the Bullet with more violence, as we shall shew more at large. So also will the Bullets of Brass Guns penetrate with more force: and if you lard the Bullets, they will penetrate through Arms of proof. I can also by a cunning Artifice

Shoot a man through with a Bullet, and no place shall be seen where it went in, or came forth.

The minde of man is so cunning, that it hath invented a way to shoot a man quite through with a Bullet, and yet no mark of the Bullet shall appear, though all the inward parts be bruised and beaten through. Consider, that what things are heavy, are solid, and so subtile, that they will penetrate and leave no marks, where they entred or came out; and they will do the same, though they be united, as if they were disjoynted; and every part will act by it self alone, as it would do being united. I have said thus, to take away all occasions from ignorant and wicked people, to do mischief. I saw

A Gun discharge often, and yet no more powder was put in.

Famous Souldiers use this, not onely for Brass Cannon, but for small hand-Guns. It is thus: wrap a paper three or four times about the rammer that is put into the hollow mouth of the Gun, and drawing out the Gun-stick, fill that hollow place with Powder and Bullet; here and there let the Bullets be stopt in, and glewed fast, that no scissure or vent may appear in the paper. First, let it be put into the Gun, but loosly, that the Powder put in above, may come to the vent-hole beneath: then put your measure of Powder in atop, and stamp in your Bullet, putting Gunpowder to the touch-hole; and putting fire to it, the upper Ball shall be shot off with its Powder: presently thrust in a sharp instrument at the vent-hole, and make a hole in the Carteridge, and feed it with Powder, and put fire to it again; and in short time it will discharge twice. I can

Blind your eyes with the smoke.

This may much profit, when enemies come to storm a City. But first we must consider the wind, that it may be on the backs of our men, and may carry the smoke into the faces of our enemies. Let there be measures made like lanthorns, so wide that they may go in at the mouths of the Brass Guns: fill them with Powder of Euphorbium, Pepper, quick Lime, Vine-ashes, and Arsnick sublimate; and put them into the hollow of it, after the Gunpowder: for by force of the fire, will these paper-frames break; and the smoke of the Powder, if it come at the eyes of the enemies, will so trouble them, that casting away their weapons, they can hardly save their eyes.

CHAP. XIII.

How it may be, that a Candle shall burn continually.

Before we end this Book, I shall discover, whether it may be that a Candle once lighted, should never be put out; which seems very contrary to the reason of the corruptible things of this world, and to be past belief. But let us see first whether the Antients ever attempted it, or did it. We read in the Roman Histories, that there was at *Rome*, in the Temple of the goddess *Vesta*; and of *Minerva*, at Athens; and of *Apollo*, at Delphi, a perpetual fire kindled. But this seems to be false; for I remember that I have read in many Authors, that this perpetual fire was always kept so by the Vestal Nuns, that it should never go out: as we find it in *Plutarch*, in the Life of *Numa*; and then in the time of the Civil War, and of *Mithridates*, it went out. At Delphi it was watched by widows, who took care, by always pouring in

of

of Oyl, that it should never go forth: but this failed, when the Medes burnt that Temple. Of the same sort was that fire, God appointed by *Moses* in the Scriptures. The fire shall always burn upon mine Altar, which the Priest shall always keep lighted, putting under wood day by day. Wherefore, the fire was not perpetual in the Temples of the gods of the Gentiles. Yet I read that about the Town Ateste neer Padua, there was found an earthen Pitcher, in which there was another little Pitcher, and in that there was found a little light still burning, which by the hands of some ignorant fellows, pouring it rudely forth, was broken, and so the flame was put out. And in our time, about the year 600. in the Island Nesis, that stands in Naples, there was a Marble Sepulchre of some Roman found, and that being opened, a Vial was found within it, in which there was a Candle: when this was broken, and it came to the light, it went out: it was shut in before the coming of our Saviour. Some others I have heard of, by report of my friends, that were found and seen with their eyes. Whence I collect this may be done, and was done by our Ancestors. Let us see if we can do the same. Some say that Oyl of Metals may last long, and almost perpetually. But this is false: for Oyl of Metals will not burn. Others say, Oyl of Juniper from the wood will last long, because the coles of that wood may be kept a whole year alive under ashes. But this is most false, because I kept a cole under ashes, and it would not last two, nor yet one day; and the Oyl of the wood burns most vehemently, and is sooner wasted then common Oyl. Some boast they have drawn Oyl from the incombustible stone, thinking that flame cannot consume that: for a wick made thereof, will never be burnt; and yet burns always, if you put Oyl always to it: But if that be true, that the wick is not consumed by fire, yet that follows not that Oyl extracted from it, should burn always and never waste: And no man yet was ever seen to draw Oyl from the stone Amiants that would burn. Others think that Oyl drawn from common Salt, will last always; for if you cast Salt into Oyl, it makes the Oyl in the Lamp last twice as long, and not be consumed, which I affirm to be true; therefore if Oyl be distilled from it, it will burn always and never waste. Yet this follows not that Oyl drawn from Salt will burn continually; and Oyl distilled from it will burn no more than a stone of *Aqua fortis*, that parts Gold and Silver, of which kind it is. But it is an ignorant thing to imagine, that an Oyl may be made that shall burn always, and never consume. Wherefore some other thing must be thought on. Some say (and they do not think foolishly) that fire in a Vial doth not always burn; but in the Vial there is some composition laid up, that so soon as it comes to the Air, presently takes fire, and seems to burn onely at that time, yet it never burned before. This may be true: for as I often have laboured in Chymical matters, a glass well stopt, and forgot by me after the things were burnt in it; and being so left for many moneths, I may say, many years: at last, being opened, hath been seen to flame, and burn, and smoke. What I had burnt I had forgot, but they might be the same things, that I heard of by my friend, that had the same chance: for when he had boil'd Litharge, Tartar, quick Lime, and Cinnaber in Vinegar, until it was all evaporated; and then covering and luting the Vessel well, he set it into a vehement fire, and when it was enough, he set it by till it was cold: after some moneths, when he went to open it to see his work, a flame suddenly flew out of the Vessel, and set fire on some things, when as he thought of no such matter: and the same hath happened to many more. Moreover, when I boiled Linseed Oyl for the Press, when the flames took within, I covered the pot with clothes to put it out: after some time I opened the Vessel, the Oyl at the Air coming to it flamed again, and took fire. But experience is against this opinion: For who saw a Candle shut up close in a glass Vial, and to keep its flaming quality, and to give light? For the Ancients thought that the souls of the dead did always rest in the grave, as the ashes do; and that they might not lye in the dark, they endeavoured all they could to send out this light, that their souls might enjoy light continually. Therefore we must think on another experiment, and make trial of it. But this must be held for a rare and firm principle in Natures shop, that the cause of wonders is because there can be no vacuum; and the frame of the work will sooner break asunder, and all things run to nothing, then there can be any such thing: Wherefore if a flame

flame were shut up in a glass, and all vent-holes stopt close, if it could last one moment, it would last continually, and it were not possible for it to be put out. There are many wonders declared in this Book, and many more shall be set down, that have no other cause. But how the flame should be lighted within side, this is worth the while to know; It must be a liquor or some subtile substance, and that will evaporate but little; and if then it can be shut up in the glass, when the glass is shut it will last always: which may easily be performed by burning-glasses, fire, industry, and cunning. It cannot be extinguished, because the Air can come in nowhere to fill up the emptiness of the Vial: The Oyl is always turned into smoke, and this, being it cannot be dissolved into Air, it turns to Oyl, and kindleth again, and so it will always by course afford fuel for the light. You have heard the beginnings; now search, labour, and make trial.

THE

THE THIRTEENTH BOOK OF Natural Magick:

Of tempering Steel.

The Proeme.

I Have taught you concering monstrous Fires ; and before I part from them, I shall treat of Iron Mines ; for Iron is wrought by Fire : not that I intend to handle the Art of it ; but onely to set down some of the choicest Secrets that are no less necessary for the use of men, in those things I have spoken of already, besides the things I spake of in my Chymical works. Of Iron there are made the best and the worst Instruments for the life of man, saith Pliny. *For we use it for works of Husbandry and building of Houses ; and we use it for Wars and Slaughters : not onely hard by ; but to shoot with Arrows, and Darts, and Bullets, far off. For, that man might die the sooner, he hath made it swift, and hath put wings to Iron. I shall teach you the divers tempers of Iron, and how to make it soft and hard, that it shall not onely cut Iron and other the hardest substances, but shall engrave the hardest Porphyr and Marble Stones. In brief, the force of Iron conquers all things.*

Chap. I.

That Iron by mixture may be made harder.

IT is apparent by most famous and well-known Experience, that Iron will grow more hard by being tempered, and be made soft also. And when I had sought a long time whether it would grow soft or hard by hot, cold, moist or dry things; I found that hot things would make it hard and soft, and so would cold and all the other qualities: wherefore somthing else must be thought on to hunt out the causes. I found that it will grow hard by its contraries, and soft by things that are friendly to it; and so I came to Sympathy and Antipathy. The Ancients thought it was done by some Superstitious Worship, and that there was a Chain of Iron by the River Euphrates, that was called Zeugma, wherewith *Alexander the Great* had there bound the Bridge ; and that the links of it that were new made, were grown rusty, the other links not being so. *Pliny* and others think, That this proceeded from some different qualities ; it may be some juices or Minerals might run underneath, that left some qualities, whereby Iron might be made hard or soft. He saith, But the chief difference is in the water that it is oft plunged into when it is red hot. The pre-eminence of Iron that is so profitable, hath made some places famous here and there ; as Bilbilis and Turassio in Spain, Comum in Italy : yet are there no Iron Mynes there. But of all the kindes, the Seric Iron bears the Garland ; in the next place, the Parthian : nor are there any other kindes of Iron tempered of pure Steel : for the rest are mingled. *Justine* the Historian reports, That in Gallicia of Spain, the chiefest matter for Iron is found; but the water there is more forcible then the Iron : for the tempering with that, makes the Iron more sharp ; and there is no weapon approved amongst them, that

is not made of the River Bilbilis, or tempered with the water of Chalybes. And hence are those people that live neer this River called Chalybes; and they are held to have the best Iron. Yet *Strabo* saith, That the Chalybes were people in Pontus neer the River Thermodon. *Virgil* speaks,

And the naked Calybes Iron.

Then, as *Pliny* saith, It is commonly made soft with Oyl, and hardened by Water. It is a custome to quench thin Bars of Iron in Oyl, that they may not grow brittle by being quenched in Water. Nothing hath put me forward more to seek higher matters, then this certain Experiment, That Iron may be made so weak and soft by Oyl, that it may be wrested and broken with ones hands: and by Water it may be made so hard and stubborn, that it will cut Iron like Lead.

CHAP. II.

How Iron will wax soft.

I Shall first say how Iron may grow soft, and become tractable; so that one may make Steel like Iron, and Iron soft as Lead. That which is hard, grows soft by fat things, as I said; and without fat matter, by the fire onely, as *Pliny* affirms. Iron made red hot in the fire, unless you beat it hard, it corrupts: as if he should say, Steel grows soft of it self, if it be oft made red hot, and left to cool of it self in the fire: and so will Iron grow softer. I can do the same divers wayes.

That Iron may grow soft.

Anoynt Iron with Oyl, Wax, Asafœtida; and lute it over with straw and dung, and dry it: then let it for one night be made red hot in burning coals. When it grows cold of it self, you shall finde it soft and tractable. Or, take Brimstone three parts, four parts of Potters Earth powdered: mingle these with Oyl to make it soft. Then cover the Iron in this well, and dry it, and bury it in burning coals; and, as I said, you may use Tallow and Butter the same way. Iron wire red hot, if it cool alone, it will be so soft and ductible, that you may use them like Flax. There are also soft juices of Herbs, and fat, as Mallows, Bean-Pods, and such-like, that can soften Iron; but they must be hot when the Iron is quenched, and Juices, not distilled Waters: for Iron will grow hard in all cold waters, and in liquid Oyl.

CHAP. III.

The temper of Iron must be used upon soft Irons.

I Have said how Iron may be made softer, now I will shew the tempering of it, how it may be made to cut sharper. For the temper of it is divers for divers uses. For Iron requires several tempers, if it be to cut Bread, or Wood, or Stone, or Iron, that is of divers liquors; and divers ways of firing it, and the time of quenching it in these Liquors: for on these doth the business depend. When the Iron is sparkling red hot, that it can be no hotter, that it twinkles, they call it Silver; and then it must not be quenched, for it would be consumed. But if it be of a yellow or red colour, they call it Gold or Rose-colour: and then quenched in Liquors, it grows the harder: this colour requires them to quench it. But observe, That if all the Iron be tempered, the colour must be blew or Violet colour, as the edge of a Sword, Rasor or Lancet: for in these the temper will be lost if they are made hot again. Then you must observe the second colours; namely, when the Iron is quenched, and so plunged in, grows hard. The last is Ash colour: and after this if it be quenched, it will be the least of all made hard. For example:

The

The temper of a Knife to cut Bread.

I have seen many ingenious men that laboured for this temper, who, having Knives fit to cut all hard substances, yet they could scarce fall upon a temper to cut Bread for the Table. I fulfilled their desire with such a temper. Wherefore to cut Bread, let the Steel be softly tempered thus: Heat gently Steel, that when its broken seems to be made of very small grains; and let it be excellent well purged from Iron: then strike it with a Hammer to make a Knife of it: then work it with the File, and frame it like a Knife, and polish it with the Wheel: then put it into the Fire, till it appear Violet-colour. Rub it over with Sope, that it may have a better colour from the Fire: then take it from the Fire, and anoynt the edge of it with a Linen-cloth dipt in Oyl of Olives, until it grow cold; so you shall soften the hardness of the Steel by the gentleness of the Oyl, and a moderate heat. Not much differs from this,

The temper of Iron for Wood.

Something harder temper is fit to cut wood; but it must be gentle also: therefore let your Iron come to the same Violet-colour, and then plunge it into waters: take it out; and when it appears Ash-colour, cast it into cold water. Nor is there much difference in

The temper for Instruments to let blood.

It is quenched in Oyl, and grows hard; because it is tender and subtile: for should it be quenched in water, it would be wrested and broken.

The temper of Iron for a Sythe.

After that the Iron is made into a Sythe, let it grow hot to the colour of Gold, and then quench it in Oyl, or smear it with Tallow, because it is subtile Iron; and should it be quenched in waters, it would either crumble or be wrested.

Chap. IV.

How for all mixtures, Iron may be tempered most hard.

NOw I will shew some ways whereby Iron may be made extream hard: for that Iron that must be used for an Instrument to hammer, and polish, and fit other Iron, must be much harder then that.

The temper of Iron for Files.

It must be made of the best Steel, and excellently tempered, that it may polish, and fit other Iron as it should be: Take Ox hoofs, and put them into an Oven to dry, that they may be powdered fine: mingle well one part of this with as much common Salt, beaten Glass, and Chimney-soot, and beat them together, and lay them up for your use in a wooden Vessel hanging in the smoak; for the Salt will melt with any moisture of the place or Air. The powder being prepared, make your Iron like to a file: then cut it chequerwise, and crossways, with a sharp edged tool: having made the Iron tender and soft, as I said, then make an Iron chest fit to lay up your files in, and put them into it, strewing on the powders by course, that they may be covered all over: then put on the cover, and lute well the chinks with clay and straw, that the smoak of the powder may not breath out; and then lay a heap of burning coals all over it, that it may be red-hot about an hour: when you think the powder to be burnt and consumed, take the chest out from the coals with Iron pinchers, and plunge the files into very cold water, and so they will become extream hard. This is the usual temper for files; for we fear not if the files should be wrested by cold waters. But I shall teach you to temper them excellently

Another way.

Take the pith out of Goats horns, and dry it, and powder it: then lay your files in a little Chest strewed over with this Powder, and do as you did before. Yet observe this, That two files supernumerary must be laid in, so that you may take them forth at pleasure: and when you think the Chest, covered with burning coals,

hath taken in the force of the Powder, take out one of the supernumerary Files, and temper it, and break it; and if you finde it to be very finely grain'd within, and to be pure Steel, according to your desire, take the Chest from the fire, and temper them all the same way: or else, if it be not to your minde, let them stay in longer; and resting a little while, take out the other supernumerary File, and try it, till you have found it perfect. So we may

Temper Knives to be most hard.

Take a new Ox hoof, heat it, and strike it with a Hammer on the side; for the pith will come forth: dry it in an Oven; and, as I said, put it into a pot, alwayes putting in two supernumeraries, that may be taken forth, to try if they be come to be pure Steel; and doing the same as before, they will be most hard. I will shew

How an Habergeon or Coat of Arms is to be tempered.

Take soft Iron Armour of small price, and put it into a pot, strewing upon it the Powders abovesaid; cover it, and lute it over, that it have no vent, and make a good Fire about it: then at the time fit, take the Pot with iron pinchers; and striking the Pot with a Hammer, quench the whole Herness, red hot, in the foresaid water: for so it becomes most hard, that it will easily resist the strokes of Poniards. The quantity of the Powder is, that if the Harness be ten or twelve pounds weight, lay on two pounds and a half of Powder, that the Powder may stick all over: wet the Armour in water, and rowl it in the Powder, and lay it in the pot by courses. But, because it is most hard, lest the rings of a Coat of Male should be broken, and flie in pieces, there must be strength added to the hardness. Workmen call it a Return. Taking it out of the Water, shake it up and down in Vinegar, that it may be polished, and the colour be made perspicuous: then make red hot a plate of Iron, and lay part of the Coat of Male, or all of it upon the same: when it shews an Ash-colour, workmen call it Berotinum: cast it again into the water, and that hardness abated; and will it yield to the stroke more easily: so of a base Coat of Male, you shall have one that will resist all blows. By the mixture of Sharp things, iron is made hard and brittle; but unless strength be added, it will flie in pieces with every blow: therefore it is needful to learn perfectly how to add strength to it.

CHAP. V.

Liquors that will temper Iron to be exceeding hard.

I Said that by Antipathy Iron is hardened, and softened by Sympathy: it delights in fat things, and the pores are opened by it, and it grows soft: but on the contrary, astringent things, and cold, that shut up the pores, by a contrary quality, make it extreme hard; they seem therefore to do it: yet we must not omit such things as do it by their property. If you would have

A Saw tempered to saw Iron,

Make your Saw of the best Steel, and arm it well that it be not wrested by extinguishing it. Then make a wooden Pipe as long as the Iron of the Saw, that may contain a liquor made of Water, Alom, and Piss; Plunge in the red hot Iron, and take it out, and observe the colours: when it comes to be violet, put all into the liquor, till it grow cold. Yet I will not conceal, that it may be done by a Brass wire bent like a bow, and with Powder of Emril and Oyl: for you shall cut Iron like Wood. Also, there are tempered

Fish-hooks to become extream hard.

The Hook serves for a part to catch Fish; for it must be small and strong: if it be great, the Fish will see it, and will not swallow it; if it be too small, it will break with great weight and motion; if it be soft, it will be made straight, and the Fish will get off.

off. Wherefore, that they may be strong, small, and not to be bended in the mouth; you shall thus temper them: Of Mowers Sythes make wire, or of the best Steel, and make Hooks thereof, small and fine: heat them not red-hot in the Fire; for that will devour them: but lay them on a plate of red hot Iron. When they grow red, cast them into the water: when they are cold, take them out and dry them. Then make the plate of Iron hot again, and lay on the Hooks the second time; and when an Ash colour, or that they commonly call Berotinus, appears, plunge them into the water again, that they may be strong: for else they would be brittle. So you may make

Culters extream hard.

Albertus, from whom others have it, saith, That Iron is made more strong, if it be tempered with juice of Radish, and Water of Earth-worms, three or four times. But I, when I had often tempered it with juice of Radish, and Horse-Radish, and Worms, I found it alwayes softer, till it became like Lead: and it was false, as the rest of his Receits are. But thus shall you make Steel extream hard, that with that onely, and no other mixture, you may make Culters very hard: Divide the Steel into very small pieces like Dice, and let them touch one the other, binding Iron wires over them, fastning all with an Iron wire: put them into the Fire till they grow red hot, and sparkle, at least fifteen times, and wrap them in these powders that are made of black Borax one part, Oyster-shells, Cuttle-bones, of each two parts: then strike them with a Hammer, that they may all unite together, and make Culters, or Knives, or what you will: for they will be extream hard. For this is the most excellent sort of Steel, that onely tempered with waters, is made most hard. There is another, but not so good; and unless it be well tempered, it alwayes grows worse. It is this:

To temper a Graver to cut Marble.

Make your Graver of the best Steel, let it be red hot in the Fire, till it be red or Rose coloured; dip it into water, then take it away, and observe the second colour. When it is yellow as Gold, cast it into the water. So almost is

A Tool made to cut Iron.

When the same red Rose colour appears, plunge it into the water, or some sharp liquor that we shall shew; and you must observe the second yellow colour, or wheat colour, and then cast it into the water. These are the best

Tempers for Swords.

Swords must be tough, lest whilst we should make a thrust, they should break; also, they must have a sharp edge, that when we cut, they may cut off what we cut. The way is thus: Temper the body of it with Oyl and Butter, to make it tough; and temper the edge with sharp things, that they may be strong to cut: and this is done, either with wooden Pipes, or woollen Cloths, wet with Liquor: use it wittily and cunningly.

Chap. VI.

Of the temper of a Tool shall cut a Porphyr Marble Stone.

Our Ancestors knew well to temper their Tools, wherewith they could easily cut a Porphyr Stone, as infinite Works testifie that were left to us: but the way was shewed by none, and is wholly concealed; which is a mighty disgrace to our times, when we neglect such rare and useful Inventions, and make no account of them. That we might be freed from this dishonour, with great care, and pains, and cost, I made trial of all things came to my hand, or I could think of, by divers wayes and experiments, that I might attain unto it: at last, by Gods great blessing, I found a far greater passage for to come to these things, and what exceeds this. And I will not be grieved to relate what I found out by chance, whilst I made trial of these things.

things. The business consisted in these difficulties. If the temper of the Graver was too strong and stubborn, with the vehement blow of the Hammer it flew in pieces: but if it was soft, it bowed, and would not touch the stone: wherefore it was to be most strong and tough, that it might neither yield to the stroke, nor flie asunder. Moreover, the juice or water the Iron must be tempered in, must be cleer and pure: for if it be troubled, the colours coming from heat could not be discerned: and so the time to plunge the Tools in would not be known, on which the whole Art depends. So then, cleer and purified juices will shew the time of the temper. The colours must be chiefly regarded: for they shew the time to plunge it in and take it out; and because that the Iron must be made most hard and tough, therefore the colour must be a middle colour between silver and gold: and when this colour is come, plunge the whole edge of the Tool into the liquor, and after a little time, take it out; and when it appears a Violet-colour, dip it into the liquor again, lest the heat, yet remaining in the Tool, may again spoil the temper: yet this we must chiefly regard, that the liquors into which the Iron is plunged, be extream cold; for if they be hot, they will work the less: and you must never dip an Iron into water, that other Iron hath been dipt in before; for when it is grown hot, it will do nothing: but dip it into some other that is fresh and cold; and let this in the mean time, swim in some glazed Vessel of cold water, that it may soon grow cold, and you shall have it most cold for your work. Yet these are

The hardest tempers of Iron.

If you quench red-hot Iron in distilled Vinegar, it will grow hard. The same will happen, if you do it into distilled Urine, by reason of the Salt it contains in it. If you temper it with dew, that in the month of *May* is found on Vetches Leaves, it will grow most hard. For what is collected above them, is salt; as I taught elsewhere out of *Theophrastus*. Vinegar, in which Salt Ammoniac is dissolved, will make a most strong temper: but if you temper Iron with Salt of Urine and Salt-Peter dissolved in water, it will be very hard; or if you powder Salt-Peter and Salt Ammoniac, and shut them up in a Glass Vessel with a long neck, in dung, or moist places, till they resolve into water, and quench the red-hot Iron in the water, you shall do better. Also, Iron dipped into a liquor of quick Lime, and the Salt of Soda purified with a Spunge, will become extream hard. All these are excellent things, and will do the work: yet I shall shew you some that are far better.

To temper Iron to cut Porphyr Marble.

Take the fugitive servant, once received, and then exalted again, and shut it in a glazed Vessel, till it consume in Fire or water; so the Iron Tool will grow hard, that you may easily have your desire: but if it be too hard, that it be too brittle, add more liquor, or else more Metal: yet take care of this alone, whilst you have found the measure of your work: for the Iron will grow strong and tough. The same also will be happily performed by the foul moysture of the Serpent Python, and by the wasting thereof: for the salt gives force, and the fat toughness. And these are the best and choicest that I have tried in this kinde.

CHAP. VII.

How to grave a Porphyr Marble without an Iron tool.

Some have attempted to do this without any Graver, but with strong and forcible water; and this Argument moved them to it: When they saw Vinegar and sharp juices to swell into bubbles, being cast upon Marble, and to corrode it, they supposed that if they should draw very strong sharp liquor from sharp and corroding things, they might do the same work without labour. At last, thus they did it: Take a little Mercury sublimate, and a little Salt Ammoniac, distil these as I shewed in Glass Stills: then take a little Verdigrease, Tin calcined, and of the fire-stone, powder all these with *Sal Gemma*, and common Salt, and Salt Ammoniac, and distil them, and pour the

the distilled liquor again upon the Fæces, and distil it again, and do it again the third time: then keep the liquor in a Vessel well stopt. When you go about your work, smeer the Porphyr Marble with Goats suet, onely touch not those parts you mean to have engraved: you must make a ledge about it, that when you pour on your water, it may not run off here and there; and the liquor poured on will eat most strongly: when it ceaseth to eat, cast it away, and pour on fresh; and do this so often, till you have graved it so much as you please, and you have done.

Chap. VIII.

How Iron may be made hot in the fire to be made tractable for works.

Many seek most diligently, how by a secret Art Iron may be so tempered, that it may neither break, nor be shot through with Guns. But these men do not take care of what they have before them, and seek for what they have not; for would they consider whilst the Iron heats, the thing they seek for so eargerly, is before their eyes. I say therefore, That the reason why Swords break and flie in pieces, and brests of Iron are shot through with Guns, is, because there are flaws in the Iron, and it cleaves in divers places, and the parts are ill united; and because these clefts are scarce visible: this is the cause that when they are bended or stricken they break: for if you mark well, whenever Knives or Swords break in pieces, you shall alwayes finde these craks and flames, and the solid parts are not broken; and being bended, resist. But when I sought for the cause of these flaws, I found at last, that in Smiths Shops, where Iron is made hot, they heap up coals over the Iron, and the refuse of coals; saying, The Iron will not heat so easily, if some rubbish of the coals and dust be not heaped over it: and with this trumpery-dust, there are always mingled small stones, chalk, and other things gathered together in pieces; which, when they meet in the fire, they cause many knots outwardly, or cavities inwardly, and cracks, that the parts cannot well fasten together. Whence, though the business be trivial and of small regard, yet this is the cause of so great inconveniences that follow. Wherefore, to avoid this impediment, I thought on this course to be taken: I cast my coals into a wooden bowl full of water: for they will swim on the top, (but the filth and bricks will fall to the bottom) those that swim, I take out and dry them; and those I use for my works. What a blessing of God this profitable Invention is! for thus men make Swords, Knives, Bucklers, Coats of Male, and all sorts of Armour so perfect, that it were long and tedious to relate: for I have seen Iron brests, that scarce weighed above twelve pound, to be Musket-proof. And if we should add the temper to them, they would come to far greater effects.

Chap. IX.

How Damask Knives may be made.

Now whilst I set down these Operations very pleasant, namely, how Damask Knives may be made to recover their marks that are worn out, and how the same marks may be made upon other Knives. If then we would

Renew the waved marks of Damask Knives that are worn out,

polish a Poniard, Sword or Knife, very well with Powder of Emril and Oyl, and then cleanse it with Chalk, that no part may be dark, but that it may glister all over: then wet it all with juice of Lemmons mingled with Tanners water, that is made with Vitriol: for when it is dry, the marks will all be seen in their places, and wave as they did before. And if you will

Make marks with Damask Knives,

And that so acurately, that you can scarce know them from Damask Knives: Polish a Knife very well, as I said, and scowre it with Chalk: then stir with your hands,

Chalk mingled with water; and touching it with your fingers, rub the edge of the Sword that was polished, and you shall make marks as you please: when you have done, dry them at the fire or Sun: then you must have a water ready wherein Vitriol is dissolved, and smeer that upon it: for when the Chalk is gone, it will dye it with a black colour. After a little stay, wet it in water, and wash it off: where the Chalk was, there will be no stain; and you will be glad to see the success. You may with Chalk make the waving Lines running up and down. If any one desires

To draw forth Damask Steel for work,

You may do it thus: for without Art it is not to be done. Too much heat makes it crumble, and cold is stubborn: but by Art, of broken Swords Knives may be made very handsomely; and Wheels and Tables, that Silver and Gold wire are drawn through, and made even by, to be used for weaving: Put it gently to the fire, that it may grow hot to a Golden colour; but put under the fire for ashes, Gip calcined, and wet with water: for without Gip, when you hammer it, it will swell into bubbles, and will flie and come to be dross and refuse.

CHAP. X.

How polished Iron may be preserved from rust.

IT is so profitable to preserve Iron from rust, that many have laboured how to do it with ease. *Pliny* saith, That Iron is preserved from rust, by Ceruss, Gip, and liquid Pitch. But he shews not how Ceruss may be made: Yet those that know how to make Oyl of Ceruss without Vinegar, Iron being smeered therewith, is easily preserved from rust. Some anoynt the Iron with Deers suet, and so keep it free from rust; but I use the fat substance in the Hoofs of Oxen.

THE

THE FOURTEENTH BOOK OF Natural Magick:

I shall shew some choice things in the Art of Cookery.

The Proeme.

THe Cooks Art hath some choice Secrets, that may make Banquets more dainty and full of admiration: These I purpose to reveal, not that so I might invite Gluttons and Parasites to Luxury, but that with small cost and expence, I might set forth the curiosities of Art, and may give occasion to others thereby to invent greater matters by these. The Art consists about eating and drinking. I shall first speak of Meats, then of Drinks; and by the way I shall not omit some merry pass-times, that I may recreate the Guests, not onely with Banquets, but also with Mirth and Delights.

Chap. I.

How Flesh may be made tender.

I Shall begin with Flesh, and shew how it may be made tender, that Gluttons much desire. I shall do it divers ways; Some that proceed from the kind of their death; others from the secret properties of things: and they will grow so tender, that they will almost resolve into broth. Then how whilest the creatures are yet alive, they may be made tender. For example:

How to make Sheeps flesh tender.

The Flesh of creatures killed by their enemies, especially such as they hate and fear, will be very tender. *Zoroaster* in his *Geoponicks* saith, that Sheep killed by Wolves, and bitten, their flesh will be more tender, and so the sweeter. *Plutarch* in *Symposiacis* gives the cause of it. Sheeps Flesh, he saith, bitten by a Wolf becomes the sweeter, because the Wolfe by biting, makes the Flesh more flaggy and tender. For the breath of the Wolfe is so hot, that the hardest bones will consume in his stomach, and melt; and for this cause, those things will the sooner corrupt, that the Wolfe bites. And both Hunters and Cooks can testifie, that creatures killed divers ways, are diversly affected. Some of these are killed at one blow, that with one stroke they lye for dead: yet others are hardly killed at many blows. And which is more wonderful, some by a wound given with the Iron weapon, have imprinted such a quality upon the creature, that it presently corrupted, and would not keep sweet one day; and others have killed them as suddenly, yet no such quality remain'd in the flesh that was killed, and it would last some time. Moreover, that a certain vertue, when creatures are slain or dye, comes forth to their skins, and hair, and nails, *Homer* was not ignorant of, who writing of skins and thongs; A thong saith he of an ox slain by force, for the skins of those creatures are tougher and stronger, when they dy not by old age or of diseases, but are slain. On the contrary, such as dye by the bitings of Beasts, their hoofs will grow black, and their hairs fall off, and their skins will wither and flag. Thus far *Plutarch*. But I think these things

are false; for how should Sheeps flesh grow tender by the Wolfes breath, I understand it not: For other creatures that are killed by their enemies, and flesh of a contrary nature doth also grow tender, where there are no hot vapours. But I think that the absence of blood, makes the flesh tender, for these reasons. Quails and Pheasants killed by Hawks, are very tender, but their hearts are found full of blood, and hard within them. Deer and Bores, killed by Dogs, are more tender; but harder if by Guns: and about the heart the parts are so hard, that they can scarce be boiled. Fear of death drives the blood to the heart; the other parts are bloodless, as shall appear by the following experiments. As

How Geese, Duck, Pheasants, Quails, and other Birds become most tender.

This is easily done, if we hunt them and fly Hawks, and other birds of prey, at them; for whilst they fight, they strive to be gone, and they are sometime held in the Falcons Tallents, and are wounded with divers strokes; and this makes them so tender that it is wonderful: Wherefore, when we would eat crammed Birds, we should purposely fly a Hawk at them, and being killed by them, should grow more tender to be desired. So

That Ox-flesh may grow tender,

especially of old Oxen; for they are dry and hard, and will not easily boil. The Butchers set hounds at them, and let them prey upon them, and they will for some hours defend themselves with their horns: at last, being overcome by multitudes of Dogs, they fall with their ears torn, and bit in their skin; these brought into the shambles, and cut out, are more tender than ordinary. Some of them fighting openly with Bears, and sometimes kill'd by them, if any of the body be left, it will be so tender that it will melt in a mans mouth. We may do the same, if we keep creatures sometime in fear of death, and the longer you keep them, so the tender they will be. For

To make Hens tender,

we fright them off from high Towers; so we do Turkies, Peacocks: and when they cannot fly away by the weight of their bodies, for fear of death, with great pains and shaking of their wings, they fall down, that they may take no hurt by falling. Those that are so killed with fear of death, grow very tender. So old Pigeons that by chance had fallen into deep pits, when they had long laboured, struggling with their fluttering wings above the waters to save themselves from drowning, with strugling and fear of death they grew very tender; and by this accident we have learned, that when we would have them very tender, we purposely drive them in. *Horace* in Serm. saith almost the same.

How a Cock may grow tender,

if you must suddenly set him before your friends, and cannot help it. If that a guest do come by chance at night, and if the cock be tough, not fit to eat, drown'd him alive in Muscadel out right, and he will soon come to be tender meat. We use to hang up Turkies alive by the bills, at the sadle-bow, when we ride; and these being thus rack't and tossed with great pains, at the journeys end you shall find them dead, and very tender.

CHAP. II.

How flesh may grow tender by secret propriety.

SOme things there are, that by secret propriety make flesh tender. I shall record two prodigious miracles of Nature. One, that hung on a fig-tree,

Cocks flesh grows tender,

and so short, that it is wonderful: Another, that wild Cocks bound to a fig-tree, will

grow tame, and stand immoveable. *Plutarch* in his *Symposiacks*, gives the reason, why the Sacrifices of Cooks hung to a Fig-tree did presently grow tender and short, when the Cook of Aristian, amongst other meats, offered to *Hercules* a tender dunghil-Cock, newly slain, that was extream short: *Aristio* gives the reason of this tenderness to be the Fig-tree; and he maintaned, that these killed, though they be hard, will grow tender, if they be hanged up on a Fig-tree. It is certain, as we may judge by sight, that the Fig-tree sends forth a vehement and strong vapour. This also confirms that which is commonly spoken of Bulls, that the fiercest of them bound to a Fig-tree, will grow tame presently, and will endure to be touched with your hand, and to bear the yoke; and they puff out all their anger, and lay aside their courage that thus fails them: for so forcible is the acrimony of the vapour of that Tree, that though the Bull rage never so much, yet this will tame him. For the Fig-tree is more full of Milky juice, then other Trees are; so that the Wood, Boughs, Figs, are almost all full of it: wherefore, when it is burnt, the smoke it sends forth, doth bite and tear one very much; and a lixivium made of them burnt, is very detergent, and cleansing: also Cheese is curdled with Fig-tree milk, that comes forth of the Tree, if you cut the green bark. Some would have the heat to be the cause, that the Milk curds, by the juice of the Fig-tree cast in, which melts the watry substance of the humour; wherefore the Fig-tree sends forth a hot and sharp vapour, and that is digesting, and dries and concocts the flesh of Birds, so that they grow tender. So

Ox flesh may be made tender,

If you put the stalks of wilde Fig-trees into the pot, wherein Ox flesh is boil'd, they will be boil'd much the sooner, by reason of the wood. *Pliny.* I gave you the reason of it before from Antipathy. The Egyptians alluding to this, when they would describe a man that was punished to the height, they painted a Bull tied to a wilde Fig-tree: For when he rores, if he be bound to a wilde Fig-tree, he will presently grow tame. If we will have

Pulse grow tender,

because I see that there is great antipathy between Pulse and Choke fitch, that destroys and strangles them. Some call this Lions Herbe: for as a Lion doth with great rage and furiously kill Cattle and Sheep, so doth choke fitch all Pulse: wherefore this Herbe put to Pulse, when they boil, will make them boil the sooner. But

To make meats boil the sooner,

All kinds of Docks, though they be dry and juiceless, will do it, that all flesh will grow tender, and become fit to eat. Wherefore the Antients always fed on it, that it might digest the meat in their stomacks, and loose their bellies. Also the root of wilde Nettles boil'd with flesh, will make them tender. *Pliny.*

Chap. III.

How Flesh may be made tender otherwise.

There be other ways to make flesh tender: First, if flesh killed be hung in the open Air, for they will grow tender, as beginning to corrupt, but they must not stay there so long till they corrupt indeed. Wherefore you must know their quality, which will keep longest, and which not. For example

Peacocks, Partridge, Pheasants to be made tender.

Isaac saith, That a Peacock killed will be kept two days, and three in winter, that the hard flesh of it may grow soft. *Haliabas* hangs them up three days, hanging stones to their feet. *Savanrola* hangs them up ten days without weights. *Simeon Sethi* saith, That Patridge newly killed are not to be eat, but after a day or two, that they may lose their hardness. Pheasants in Summer hung up two days, and three days in winter, after they are killed, will be fit meat. *Arnoleus.* And to avoid tediousness, the same must be done with other flesh. The like

That Birds may grow tender.

If you hang those in Moon-light, that were killed in the night, they will grow more tender by boiling: For the Moon hath great vertue to make flesh tender, for it is but a kind of corruption. Therefore wood cut by Moon-light, will sooner grow rotten, and fruit sooner grow ripe. *Daphnis* the Physitian in *Athenæus*.

CHAP. IV.

How Shell-creatures may grow more tender.

Before I end to speak of ways to make flesh more tender; It will not be amiss to make Crabs tender, and by another way then I shew'd before. How we may make

Crab-fish tender shel'd.

At Rome they do so, and it becomes pleasant and excellent meat for Noble mens Tables. I speak of those Crabs bred in fresh waters: For at Venice I have eaten them that bred naturally tender in salt-waters; they call them commonly Mollecas: but they are not so sweet, as they are made at Rome; and they ask a Julius apiece. The way is, in the Moneths of *June*, *July*, *August*, and *September*, the Crabs use to cast their shels, and put off their old coat; at that time fisher-men search about the banks of Rivers, where they find their holes and caves half stopt, and by that they know the time is come to cast their shells; for the more their shells grow tender, the more they shut up their holes. They grow tender first about the feet, and by degrees it ascends over their whole bodies. When they have taken them, they bring them home, and put them every one in several earthen pots; and they put in water, that it may cover half their bodies, and so they let them remain eight or ten days, changing the water every day, and their shells will grow more tender every day. When it is all soft, that it is transparent as Crystal, they fry them with butter and milk, and bring them to the Table. So

Squils grow tender.

We must do as we did to Crabs, for they cast their shells as Crabs do: and Nature did this for some end; for when their shells are grown too thick and weighty, they can scarce crawl; wherefore by the excrements that go into it, that are consumed to make a new shell within, the former that was made is broken, and falls off.

CHAP. V.

That living Creatures may be made more fat and well tasted.

I Shall endeavour to shew how living Creatures may be made more fat and well tasted, that we may set more savory meats before our guests. The Antients were not negligent in this matter: Wherefore you shall find many ways, not onely amongst Cooks, but such as write concerning Husbandry. Liccorish Gluttons found out the ways to fat Cattle, that they might feed on them more plentifully and daintily. Hence they called them cram'd, because they were full fed, and had gross bellies. Those were called Bird-pens, where they fatted all sorts of Birds. *M. Lelius Strabo*, was the first that appointed this; and he appointed Crammers to take care of them, and ordered how much every crammed bird should eat. They will fat better in winter than in summer, because Birds at that time of the year are best, being not so much wasted with yong; and Cocks will fat better then Hens, and such as never trod nor made eggs. In summer, when it is at an end, and the sowre Grapes hang yet upon the Vines, they are at the best. I shall therefore teach

How Hens and other Birds must be crammed.

Choose

Choose a place that is hot and obscure; shut them all up apart, and so close in their pens, that they cannot come together, nor turn; and make two holes, one for their heads to put forth, and the other for their tails, that they may both eat their meat and shite it out again when it is digested. Lay soft hay under them; for if they lye hard, they will never fat. Pull off all the feathers from their heads, thighs, and from under their wings, there, that it may breed no lice; here, that the dung corrupt it not. For meat, give them gobbets of Barley-Meal, made up with water; at the first for some time, more sparingly, then after give them as much as they can digest; and you must give them no new meat, till you feel their crops that all the old is digested. When the Bird is full, let him go a while, not to wander abroad; but if there be any thing that urgeth him, he may pick it off with his bill. Let him not be set to fatting before five, or after twenty Moneths old. Yong Pigeons or Chickens, will fat better with their dams, if you pull off a few of their feathers, and bruise their legs, that they may stay in their places; and if you give meat plentifully to their dams, that they may feed themselves, and their yong ones sufficiently. Turtles are best fatted in summer: give them nothing but meat, especially Millet-seed, for they much delight to eat that; but Geese in winter: They must be put up to fat four Moneths, you need give them nothing else but Barley-Meal, and Wheat-meal three times a day; so that you give them water enough to drink, and no liberty to walk about; thus they will fat in two Moneths. But tender Pullets will not be made fat in forty days. Ducks will grow fat with all nutriment, if it be abundance; especially with Wheat, Millet-seed, Barley, and with Water-squils, Locusts, and Creatures found in Lakes. *Columella.* Pheasants, Partridges, Heath-cocks, and Turky-hens, will fat being shut up; and the first day they eat meat, the next set them water or good strong wine to drink: Let their meat be raw Barley-Meal, made up with water, giving them it by degrees; or else broken and ground Beans and Barley sod with water, and whole Millet-seed, Linseed boil'd and dry, mingled with Barley-meal: to these you may add Oyl, and make gobbets of them, and give them to eat to the full, and they will grow fat at longest in sixty days. Now I shall shew how

Four-footed Beasts are fatted.

The Sow will soonest fat, for in sixty days she will be fat. First kept hungry three days, as all the rest must be. She grows fat with Barley, Millet, Acorns, Figs, Pears, Cucumbers; rest, and not wandring. But Sows will grow fatter by wallowing in the mire. Figs and Chick-peason, will fat them soonest; and they desire change of meats. *Varro.* The Sow is fed with Beans, Barley, and other Grain; for these will not onely fat them, but give them a good rellish. The Olive, wilde Olive, Tares, Corn in straw, Grass: and they are all the better sprinkled with brine; but the more effectual will they be, if she fast three days before. *Aristotle.* Bean-husks, and Coleworts are pleasant meat for them; Salt put to them, will make them have a stomack, which in summer put into their troughs will season their meat, and make them eat it up; and by that seasoning of it, they will drink and eat the more. *Columella.* Oxen will grow fat with Corn and Grass, Tares, ground Beans, and Bean-stalks: Also with Barley, whole or broken, and parted from the hulls: also by sweet things, as pressed Figs, Wine, Elm-boughs, and with a Lotion of hot water. *Aristotle.* We feed them at home with Wine of Surrentum, or else we put Calfs to two Cows, and thus being fed with abundance of Milk, they can scarce go for fat. Also in their cratches we strew Salt stones, that they may lick them, and so drink, and they will grow exceeding fat and tender.

Chap. VI.

How the flesh of Animals is made sweeter.

Now shall I shew with some Meats, and Arts, How not onely the parts of Animals, but their whole bodies are made fat, tender, and more delicate. And first,

How

How to fat the Livers of Geese.

Our wise Anceſtours, ſaith *Pliny*, who knew the goodneſs of a Gooſe liver, taught how by cramming to make it grow great; alſo taken forth, it is augmented by ſweet Milk. And it is not without cauſe demanded, who was the firſt man that found out ſo profitable a thing: Whether it were *Scipio Metellus*, that was Conſul, or *Mar. Sejus*, that in the ſame age was a Gentleman of Rome. *Palladius* taught the way how; when Geeſe have been fatting thirty days, if you deſire to have their livers tender, you ſhall bruiſe old Figs, and ſteep them in water, and make gobbets of them, and feed the Geeſe with them twenty days together. But *Quintilius* way is, when they grow fat, you ſhall break dry wilde Radiſh in ſmall pieces, and tempering them with water, give them this to drink for twenty days. Some, that the liver may be made great, and the Geeſe fat, feed them thus. They ſhut up the Gooſe, and caſt to him Wheat ſteeped in water, or Barley the ſame way. Wheat makes him fat quickly, but Barley makes the fleſh white. Let her be fed with the ſaid grain, but ſeverally with them both, for twenty days, giving to her twice a day a moyſt Medicament made thereof; ſo that ſeven of thoſe meats, may be given her for the firſt five days, and by degrees the days following, increaſe the number of theſe meats, until twenty five days be paſt, that the days in the whole may be thirty: and when they are over, heat Mallows, and in the decoction thereof, being yet hot, give her leaven moyſtned therewith; do ſo for four days, and in the ſame days give her water and honey; changing it thrice every day, not uſing the ſame again: and do this the days following, till ſixty days: mingle dry Figs, bruiſed all this time with the ſaid leaven, and after ſixty days you may eat the Gooſe, and its liver, that will be white and tender. Which being taken forth, muſt be put into a large veſſel, wherein there is hot water, that muſt be changed again and again. But the Bodies and Livers of the females are beſt, but let them be Geeſe not of one year, but from two years old to four. *Horace* in Serm. ſpeaks of this,

Fat Figs do make the Gooſe white, Liver great.

And *Juvenal*, *Satyr* 5.

A Gooſe's Liver fed before him ſtood,
As big as a Gooſe, and to eat as good.

And *Martial*,

The Liver's greater then the Gooſe, that's true,
But now you'l wonder where this Liver grew.

Athenæus writes, That this was of great account at Rome. When you kill the Gooſe, take out the Liver quickly and caſt it into cold water, that it may be ſolid; then fry it in Gooſe-greaſe, in a frying pan, and ſeaſon it with ſpices. It is a diſh for a Prince, and highly commended by many. So is

A Sows Liver fatted.

Pliny. There is art uſed for Sows Livers, as well as for Geeſe. It was the invention of *Marcus Apicius*, when they are fat with dry Figs, give them ſweet wine to drink, and kill them preſently. *Apicius*. Add to the Liver of a Sow fatted with Figs, Wine-pickle, Pepper, Time, Lovage, Suet, and a little Wine and Oyl. *Ætius*, If, ſaith he, any man feed that creature with dry Figs, the Sows Liver is preferred before all meat. I ſaid out of *Ariſtotle*, that Figs and Chick peaſon will fat a Sow beſt. *Galen*. As whilſt Sows are living, their Livers are fed for delight with dry Figs; ſo for Geeſe, I ſee their meats are moyſtned with milk, that their Livers may be not onely moſt pleaſant meat, but may be fed exceedingly, and be moſt delicate. If you will

That

That Cattle may be more excellent to eat.

Cattle that use to feed on Masterwort, and to be first cleansed, will grow very fat, and their flesh will be exceeding sweet. *Pliny.* Whence it is that this Benjamin is not for many years to be found in Cyrene, because the Farmers, that hire the grounds, finding more gain by it, devour them by their Cattel. Moreover in India, and chiefly in the Country of the Prasii, it rains liquid honey; which falling down on the grass, and the tops of Reeds in the Lakes, is admirable food for Sheep and Oxen; and the Shepherds drive them thither, where most of this sweet dew falls from the Air, and there they are feasted with it, as with pleasant bankets: and they recompence their Shepherds with a pleasant reward; for they milk very sweet milk from them, and they have no need, as the Grecians do, to temper honey with it. *Ælian.* But

How Pullets are made most white, tender, and delicate,

Such as I use to set before my friends: The way is, I shut them up five days in chambers or cellars, and I give them a dish full of chippins of bread, wet with milk, and sometimes with honey: fed thus, they will grow as fat as great Sappers in Fig time, and so tender, that they will melt in your mouth, and they taste better by far then Pheasants, Heath-cocks, or Thrushes. And it seems the Antients knew this: For saith *Pliny*, when a crammed Hen was forbid to eat at supper, by the Laws of the Antients, they found out this evasion, to feed Hens with meats wet in milk; and so they were far more delicate to set on the Table. And *Columella*. They that will make Birds not onely fat, but tender, they sprinkle the foresaid Meal with water and honey new made; and so they fat them. Some to three parts of water, put one of good wine, and wet Wheat-bread, and fat the Bird; which beginning to be fatted the first day of the Moneth, will be very fat on the twentieth day.

Chap. VII.

How the Flesh of Animals may be made better, and not to be eaten.

Again, if we will that Flesh shall be rejected for the bitterness, and ill taste of it, we must do contrary to what hath been said: Or if we will not take the pains, we must wait the times that these creatures feed on such meats, as will do it, whereby sometimes they become venemous also. As if we would have

Deers flesh become venemous,

Simeon Sethi saith, That Deers flesh, that is catcht in summer, is poyson; because then they feed on Adders and Serpents; these are venemous creatures, and by eating of them they grow thirsty: and this they know naturally; for if they drink before they have digested them, they are killed by them: wherefore they will abstain from water, though they burn with thirst. Wherefore Stags-flesh, eaten at that time, is venemous, and very dangerous. Sometimes also

Partridge are nought,

Namely, when they eat Garlick. The Chyrthæi will eat no Partridge, by reason of their food; for when they have eaten Garlick they stink, and their flesh is stinking meat, that the Fowler will not eat them. So also

Quails, and Stares, are rejected,

at that time of the year, that black Hellebour is the meat they like onely. Wherefore, when Quails feed on Hellebour, they put those that feed on them into so great danger of their lives, that they swell and suffer convulsions, and are subject to vertigo's: Wherefore Millet-seed must be boil'd with them. Also

Birds are not to be eaten,

when

when the Goose-berries are ripe; for their Feathers will grow black thereby, and men that eat them, fall into scowrings. *Dioscorides.*

The Eggs of the Barbel, or Spawn, not to be eaten

in *May*, because they are dangerous; but the Eggs are not dangerous of themselves, nor do they breed such mischiefs. For they do not do it always; for often you may eat them without danger: but they are onely then hurtful, when they feed on Willow-flowers, that fall into the waters. So are

Snails to be rejected,

when they stick fast to briars and shrubs, for they trouble the belly and the stomack, and cause vomiting. *Dioscorides.* And not onely these Animals themselves cause this mischief, but their excrements, as milk, honey, and the like. For

Milk must not be eaten,

when Goats and Sheep feed on green food, because it will loosen the belly the more: but Goats-milk doth not try the belly so much, because these Cattle feed on binding meats, as on the Oak, Mastick, Olive-boughs, and Turpentine-tree. But in such places where Cattle eat Scammony, black Hellebore, Perwincle, or Mercury, all their milk subverts the belly and stomack; such as is reported to be in the mountains of Justinum: for Goats that eat black Hellebore, that is given them when the yong leaves come first out, their milk drank will make one vomit, and causeth loathing and nauseating of the stomack. *Dioscorides.* Also there is found

Honey that is venemous,

That which is made in Sardinia, for there the Bees feed on Wormwood. At Heraclia in Pontus, some times of the year, by a property of the flowers there, Honey is made, that they which eat it grow mad, and sweat exceedingly. *Dioscorides.* There are

Eggs laid that stink.

When there are no fruits nor herbs to be seen, then Hens feed on dung, and so do other Birds that lay Eggs. But then those taste best that feed on fat things, and eat Wheat, Millet, and Panick: but such as eat Wormwood, their Eggs are bitter.

CHAP. VIII.

How Animals may be boiled, rosted, and baked, all at once.

I Have thus far spoken to please the palate. Now I shall represent some merry conceits to delight the guests, Namely,

How a Hog may be rosted, and boiled, all at once.

Athenæus in his ninth Book of *Dipnosophistæ* (*Dalachampius* translates it more elegantly) saying; There was a Hog brought to us, that was half of it well rosted, and half of it was soft boil'd in water; and the Cook had used great industry to provide it, that it should not be seen in what part he was stuck: for he was killed with a small wound under his shoulder, and the blood was so let out; all his intestines were well washed with wine; and hanging him by the heels, he again poured wine on him, and rosted him with much Pepper. He filled half the Hog with much Barley-flower, kneaded together with Wine and Barley; and he put him into an Oven, setting a brass platter under him: and he took care to rost him so leasurely, that he should neither burn, nor be taken up raw; for when his skin seemed somewhat dry, he conjectured the rest was rosted. He took away the Barley-meal, and set him on the Table. So

A Capon may be boil'd, and rosted.

Put a Capon well pulled, and his guts taken out, into a silver dish, and fill the one half

half of him with broth, and put him into an Oven; for the upper part will be rosted by the heat of the Oven, and the under part will be boiled. Nor will it be less pleasant to behold

A Lamprey fried, boil'd, and rosted all at once.

Before you boil your Lamprey, take out his bones, to make it more graceful, for his flesh is full of bones; which you shall do with two little sticks held in both hands; and fastning the Lamprey in the middle, you shall cut his back-bone in the middle: then his head and end of his tail, about which the bones are heaped, by reason of the bones pulled out; being cut off, and his entrails taken forth, put him on a spit, and wrap about three or four times with fillets, all the parts that are to be rosted and fried, strewing upon the one Pepper; and the fillets must be made wet in Parsley, Saffron, Mint, Fennel, and sweet wine; or with water and salt, or broth, for the rosted parts; for the fried parts with Oyl: and so let him be turned, always moystning the fillets with strewing on the decoction of Origanum: When part of it is rosted, take it from the fire, and it will be gallant meat; set it before your guests.

Chap. IX.

Of divers ways to dress Pullets.

I Shall here set down divers ways to dress Chickens, that will be very pleasant for the guests. So that

A boiled Peacock may seem to be alive.

Kill a Peacock, either by thrusting a quill into his brain from above, or else cut his throat, as you do for yong kids, that the blood may come forth: then cut his skin gently from his throat unto his tail; and being cut, pull it off with his feathers from his whole body to his head: cut off that with the skin, and legs, and keep it: Rost the Peacock on a spit: his body being stuffed with spices and sweet herbs, sticking first on his brest cloves, and wrapping his neck in a white linnen cloth; wet it always with water, that it may never dry: when the Peacock is rosted, and taken from the spit, put him into his own skin again; and that he may seem to stand upon his feet, you shall thrust small iron wires, made on purpose, through his legs, and set fast on a board, that they may not be discerned, and through his body to his head and tail. Some put Camphire in his mouth; and when he is set on the table, they cast in fire. *Platina* shews that the same may be done with Pheasants, Geese, Capons, and other Birds; and we observe these things amongst our Guests. But it will be a more rare sight, to see

A Goose rosted alive.

A little before our times, a Goose was wont to be brought to the Table of the King of Arragon, that was rosted alive, as I have heard by old men of credit. And when I went to try it, my company were so hasty, that we eat him up before he was quite rosted. He was alive, and the upper part of him, on the outside, was excellent well rosted. The rule to do it is thus: Take a Duck, or a Goose, or some such lusty creature, but the Goose is best for this purpose; pull all the feathers from his body, leaving his head and his neck: Then make a fire round about him, not too narrow, lest the smoke choke him, or the fire should rost him too soon; not too wide, lest he escape unrosted. Within-side set everywhere little pots full of water, and put Salt and Meum to them. Let the goose be smeered all over with Suet, and well larded, that he may be the better meat, and rost the better: put fire about, but make not too much hast: when he begins to rost, he will walk about, and cannot get forth, for the fire stops him: when he is weary, he quencheth his thirst by drinking the water, by cooling his heart, and the rest of his internal parts. The force of the Medicament loosneth and cleanseth his belly, so that he grows empty; and when he is very hot, it rosts his inward parts. Continually moysten his head and heart with a spunge. But when you see him run mad up and down, and to stumble (his heart then wants moysture) wherefore take him away, and set him on the Table to your Guests, who will cry as you pull off his parts; and you shall almost eat him up before he is dead. If you would set on the Table

A yong Pigeon, with his bones pulled out,

You shall take out his bones thus: Put a yong Pigeon, his entrails taken forth and well wash'd, for to lye a night and a day in strong Vinegar: then wash him well, and fill him with Spices and Herbs, and rost him or boil him, as you please; either way you shall find him without bones. Of old, they brought to the Table

The Trojan Hog.

The Antient Gluttons invented, how a whole Ox or Camel should be set on the Table, and divers other creatures. Hence the people had a Tale concerning the Trojan Hog; so called, because he covered in his belly, many kinds of living creatures, as the Trojan Horse concealed many armed men. *Macrobius* reports, 3. *Lib. Satur.* That *Cincius* in his Oration, where he perswades to put in practise *Fannius* his Law concerning Moderation of Expence, did Object to the men of his age, that they brought the Trojan Hog to their Tables. Collers of Brawn, and the Trojan Hog, were forbidden by the Law of regulating expence. The Hog was killed, as *Dalachampus* translates it, with a small wound under his shoulder: When much blood was run forth, all his entrails were taken out, and cut off where they began; and after that he was often and well washed with wine, and hang'd up by the heels, and again wash'd with wine, he is rosted with Musk, Pepper: then the foresaid dainties, namely, Thrushes, Udders, Gnat-snappers, and many Eggs poured unto them, Oysters, Scallops, were thrust into his belly at his mouth: he is washed with plenty of excellent liquor, and half the Hog is filled with Polenta, that is, with Barley, and Barley-Meal, Wine, and Oyl, kneaded together; and so is he put into the Oven, with a brass pan set under: and care must be had to rost him so leasurely, that he neither burn, nor continue raw: for when the skin seems crisp, it is a sign all is rosted, and the Polenta is taken away. Then a silver platter is brought in, onely gilded, but not very thick, big enough to contain the rosted Hog, that must lye on his back in it, and his belly sticking forth, that is stuft with diversity of goods; and so is he set on the Table. *Athenæus Lib. 9. Dipnosophist.* But

That an Egge may grow bigger than a mans head.

If you would have an Egge so big, there is an Art, how it may cover other Eggs in it, and not be known from a natural Egge. You shall part fifty or more yelks of Eggs, and whites, one from the other: mingle the yelks gently, and put them into a bladder, and bind it as round as you can; put it into a pot full of water: and when you see it bubble, or when they are grown hard; take them out, and add the whites to them; so fitting the yelks, that they may stand in the middle, and boil them again; so shall you have an Egge made without a shell, which you shall frame thus. Powder the white Egge-shells, clean washed, that they may fly into fine dust; steep this in strong or distilled Vinegar, till they grow soft; for if an Egge ly long in Vinegar, the shell will dissolve, and grow tender, that it may easily be thrust through the small mouth of a glass: when it is thrust in, with fair water it will come to its former hardness, that you will wonder at it: when the shells dissolved are like to an unguent, with a Pencil make a shell about your Egge that is boiled, and let it harden in clear water: so shall you have a true natural Egge.

CHAP. X.

How Meats may be prepared in places where there is nothing to rost them with.

Sometimes it falls out that Men are in places where there want many things fit to provide supper; but where convenience wants, wit may do it: if you want a frying pan, you shall know

How to fry fish on a paper.

Make a frying pan with plain paper, put in oyl and fishes: then set this on burning coles, without flame, and it will be done the sooner and better. But if you will

Rost a Chickin without a fire;

That Chickins may rost whilst we are in our Voyage: Put a piece of steel into the fire, put this into a Chicken that is pulled and his guts taken forth, and cover him well with clothes, that the heat breathe not out; and if he do smell ill, yet the meat is good. If you want Servants to turn the spit, and you would have

A Bird to rost himself,

do thus: For the Bird will turn himself. *Albertus* writes, That a Bird called a Ren, that is the smallest of all Birds, if you put him on a spit, made of Hazel-wood, and put fire under, he will turn as if he turned himself. Which comes from the property of the wood, not from the Bird: and that is false the Philosopher said; for if you put fire under a Hazel-rod, it will twist, and seem to turn it self; and what flesh you put on it, if it be not too weighty, will turn about with it. So

Eggs are rosted without fire.

Eggs laid in quick Lime, and sprinkled with water, are rosted: for the Lime will grow as hot as fire. The Babylonians have their invention, when they are in the Wilderness, and cannot have an opportunity to boil Eggs; they put raw Eggs into a sling, and turn them about till they be rosted. But if you

Want Salt

for your meats, the seed of Sumach strewed in with Benjamin, will season any thing. *Pliny.* If you want Salt, and would

Keep flesh without Salt,

Cover what flesh you will with honey, when they are fresh; but hang up the vessel you put it into, longer in winter, a less time in summer. If you would have

That Salt-flesh should be made fresh.

First, boil your Salted flesh in milk, and then in water, and it will be fresh. *Apicius.* You shall learn thus

To wash spots from linnen clothes,

If you want Sope, for red wine will so stain them, that you can hardly wash them out without it: But when it doth fall down and stain them, cast Salt upon them, and it will take out the spots. If there want

Groundlings, how to make them.

Suidas saith, That when *Nicomedes*, King of Bithynia, longed for some of these Fish, and living far from the Sea, could get none; *Apicius* the glutton, made the Pictures of these Fish, and set them on the Table, so like, as if they had been the same. They were prepared thus: He cut the female Rape-root into long thin pieces, like to these Fish, which he boil'd in Oyl, and strewed with Salt and Pepper, and so he freed him from his longing. As *Æthenæus* saith, in *Euphron. Comic.* If there want fire, I have shewed already how to make divers sorts of Artificial fires.

Chap. XI.

Of divers Confections of Wines.

NOw I come to drink, for I have spoken of meat sufficiently. And I will teach you to make many sorts of wines, and that they may be pleasant and odoriferous; for I have said already what ways it may be made without pains. If you will

That your Wine shall smell of Musk,

Take a glass Vial, and wash it, and fill it with *Aqua vita*, and put into it a little musk, stop the mouth close, that it vent not; set it in the summer-Sun two weeks, always stirring the water. The use is, if you put a drop of this into a gallon of wine, all the wine will smell of Musk; and so for Cinnamon or other Spices. So you may make

Hippocras Wine,

Take the sweetest wine, we call it commonly *Mangiaguerra*, and into four Vials full of that, pour in two pounds of beaten Sugar, four ounces of Cinnamon, Pepper, and grains of Paradise, one ounce and half: let them infuse one day; then strain them: adde in the end in a knot a little Musk, and it will be excellent Wine; or to powdred Sugar we put a little *Aqua vitæ*, wherein Cinnamon, Pepper, Grains of Paradise, and musk have been infused, as I said, and it is presently provided, for it draws forth the quintessence. I shall shew how

Wine may freeze in Glasses.

Because the chief thing desired at Feasts, is that Wine cold as ice may be drunk, especially in summer; I will teach you how Wine shall presently, not onely grow cold, but freeze, that you cannot drink it but by sucking, and drawing in of your breath. Put Wine into a Vial, and put a little water to it, that it may turn to ice the sooner; then cast snow into a wooden vessel, and strew into it Salt-peter, powdred, or the cleansing of Salt-peter, called vulgarly Salazzo. Turn the Vial in the snow, and it will congeal by degrees. Some keep snow all the summer. Let water boil in brass kettles, then pour it into great bowls, and set them in the frosty cold Air, it will freeze, and grow harder than snow, and last longer.

CHAP. XII.

To make men drunk, and to make them loath Wine.

NOw we are come to speak of Wine; before we pass from it, I will shew you how to make your guests drunk; for drunkenness at Feasts, increaseth mirth: and then how to keep them safe from drunkenness, when they are often provoked to drink healths, and to strive who shall drink most. You may with these fruits

Make men drunk.

The fruits of the Arbute, and the Lote-tree, being eaten, will make men as though they were drunk: also Dates eat in too great a quantity, cause drunkenness, and the pain of the head; Sow-bread with Wine, makes a man drunk. Amber-greese, or Musk, put in Wine, exasperate drunkenness: The filth of a Dogs ear mingled with Wine, makes one drunk, as *Albertus* saith. But *Rhases*, out of whom he took it, saith, That Wine, wherein the seeds of Ricinus are infused, if any one drink it, it will inebriate them. Camels froth, drunk with water by a drunken man, will make him mad, as possessed with a Devil. Let these suffice, for I said more in my description of Plants. But on the contrary, these things will

Take away drunkenness.

Because Hemlock, with Wine, is the cause of death by its venome, it hath been invented and found true, that Hemlock is the cause of life to others. *Pliny* seems to intimate as much. Also, venoms are prepared to drink, some taking Hemlock before, that they may drink, and die. If a man hath drunk too much Wine, that doth him hurt, he shall discuss it thus: *Cato* bids, that at the beginning and middle of Supper, a man should eat four or five tops of raw Coleworts, and it will take off his drunkenness, and remove the hurt comes by Wine, and will make a man as though he had neither eat nor drank. The Egyptians, before all meat, did eat boil'd Coleworts, and so provided themselves for drink. Many to keep themselves sober, take Colewort-seeds first. The *Tibaritæ*, saith *Simæus*, before they drank, fenced themselves by feeding on Coleworts. *Alexis.*

Yesterday thou drank'st too much,
And now thy head doth ake: but such
Distemper fasting cures; then
Eat boil'd Coleworts, drink agen.

And

And *Amphis.*

There is no means can half so well
As sudden trouble drink dispel.
For that will wonderfully cure:
Eat else Radish, that's as sure.

They were wont in a vessel of Amethyst, to make another remedy for drunkenness, that they might drink Wine without danger. *Athenæus.* If you would otherwise hinder the vapours of the Wine, drink it well tempered with water; for they are soonest drunk, that drink strongest Wines. *Africanus* saith, If thou have drunk too much, eat before meat three or four bitter Almonds: they are drying, and will drink up the moysture, and drive away drunkenness. *Plutarch* relates, That there was a Physitian with *Drusus*, who when he had first eaten five or six bitter Almonds, he always conquered at the duel of drunkenness. The powder of Pumex-stone will do as much, if the drinker take that first. *Theophrastus* saith it is dangerous, unless he drink abundantly. So *Eudemus* drank two and twenty Cups, at last he went into a Bath, and did not vomit; and supped, so as if he had drank nothing: for by its drying quality, it consumes all the moysture; and being cast into a vessel of new Wine that works, the heat of the Wine is strait allayed. There are other things prepared by the Antients, to extinguish drunkenness, as to eat Lettice at the end of Supper, for they are very cold: we eat it now first, to procure appetite: whence *Martial* writes,

Why do we first our Lettice eat?
Our Fathers made it their last meat.

Dioscorides seems to call it Acrepula, because it hinders drunkenness. Leeks discuss drunkenness: and he that takes Saffron before, shall feel no drunkenness. There are also Herbs and Flowers, that if you make Garlands of them, they will hinder drunkenness; as Violets, Roses, and Ivy-berries. The ashes of the Bill of a Swallow, powdred with Myrrhe, and strewed into the Wine you drink, will keep you secure from being drunk. *Horus* the King of Assyria found out this invention. *Pliny.* I have said how drunkenness may be disposed: now I shall shew how men shall abstain,

That love Wine, to refrain it,

There are many who when they have drank much Wine, that is the worst thing in the world for them, fall sick, and die of it. Now if you would refrain, and abhor Wine and strong drink, because the Fountain Clitorius is too far off; let three or four live eels, put into the Wine, stay there till they die. Let one drink of this Wine, who is given to drunkenness, and he will loath Wine, and always hate it, and will never drink it again or if he do, he will drink but little, and with much sobriety. Another way: wash a Tortois with Wine a good while, and give one of that wine to drink privately, half a cupfull every morning for three days, and you shall see a wonderful vertue. *Myrepsus.* VVhen one complained before the King of the Indians, that he had Sons born to him, but when once they began to drink a little wine, they all died; *Jarchus* answered him thus: It is better for them that they died, for had they lived, they would have all run mad, because they were begot of seed that was too cold. Therefore your children must abstain from wine, so that they may not so much as desire it. VVherefore if you have any more Sons born, observe this rule: see where an Owl lays her eggs; and boil her eggs rere, and give them your childe to eat; for if the childe eat them before he drinks wine, he will always hate it, and live sober, because his natural heat is made more temperate. *Philostratus*, in the life of *Apollonius*. *Democritus* saith, the desire of wine is abolished, with the watry juice that runs from Vines pruned, if you give it a drunkard to drink, who knows not of it.

CHAP.

CHAP. XIII.

How to drive Parasites and Flatterers from great mens Tables.

IT is an easie matter to drive away from our Tables, and great mens Tables, all smell-feasts, and cogging foisting fellows, and this will make our guests very cheerfull and glad, to see such Cormorants and Parasites driven away, and derided by all men. When therefore he sits down at Table,

That his hands may grow black when he wipes of the Napkin,

Beat Vitriol and Galls in a Mortar, put them in a narrow close sieve, that the powder may come forth very fine; with this wipe the Napkin, and shake it; that what sticks not, may fall off: then rub it with your hands, till you find that it sticks very fast; then wiping and shaking off what stays not within, when the Parasite hath new washed his hands and face, cast to him the Towel to wipe himself; and when it is wet, it will make his hands and face as black as a cole, that will very hardly be wash'd out with many washings. Being now wash'd and wiped,

That he may not swallow the meat he chews.

And we shall make him feel the more pain, if he be any thing dainty. I find in writing, that if you stick under the Table a needle, that hath often sowed the winding-sheet of the dead; and do this privately before supper, the guests cannot eat, that they will rather loath the meat, than eat it. But experience proves this to be false and superstitious. *Florentinus* saith, That Basel is an enemy to women, and that so much, that if it be put under the dish, and the woman knows not of it, she will never put her hand to the dish, before it be taken away: but this is a most fearful lye. For a woman and Basel agree so well, that they not onely sow and plant them with great diligence in their Gardens, hanging in the Air; but they frequently feed on them in meats and sallets. I have done it oft-times: I infused in a glass of wine one drachm of the root of an herb we call *Belladonna*, Fair Lady, not bruising it too much; and after twelve hours, or a little more, pour out this wine into another cup, and give him that must eat with you, in the morning a cup of it to drink: then detain him with you three hours; then call him to your Table, for the morsel he takes in his mouth, he can by no means swallow down, but he must hurt his chaps, and be in great pain, so that he can hardly drink. If you would have him eat or drink, let him gargle a good quantity of milk or vinegar in his mouth, and he will be as if he had suffered nothing at all. If we will

Drive Parasites from great mens Tables,

we can easily do it thus: If we strew some of the dry roots of Wake-robbin on the daintiest meats, like Cinnamon or Pepper, in powder; when he takes a bit of it, it will so burn his chaps, and bite his mouth and tongue, and so fetch off the skin of his tongue, that he will so mump, and draw his chaps in and out, and gape, and make such sport, that will make people laugh: and the pain will not abate, until he hath anointed his chaps with butter and milk. Moreover, if you cut the leaves of Cuckowpint small, and mingle them with sallets; those that eat of them, will have their mouths and tongues to drivel so much, with thick spittle, that they cannot eat till they have wash'd it off. And it will be as good sport, if you like not your guest.

That all things the smell-feast eats, may taste bitter,

If you rub the edge of the Knife, and the Napkin he wipes his mouth with, with the juice of Colloquintida, or flesh of it, and lay it before him: For when he cuts bread with the Knife, or any things else, and shall touch his lips with the Napkin, it will give him such a filthy and abominable taste, that whatever he toucheth, tasteth, or licks, will have a most horrible smack with it; and the oftner he wipes his mouth, that he may wipe away this bitter taste, the more will his mouth, palate, and jaws, be tormented; that he will be forced to forsake the Table. We can also delude him so,

That when he drinks, the cup shall stick to his mouth, that he can hardly pull it off.

Besmeer the cups mouth with the milk of Figs, and Gum-tragaenth dissolved in it; for when they are dry, they will be clear: but when he drinks, the cup will stick so fast to his lips, that when he hath done drinking, he can hardly pull it off. We shall do thus,

That flesh may look bloody and full of worms, and so be rejected by smell-feasts.

Boil Hares blood, and dry it, and powder it; and cast the powder upon the meats that are boil'd, which will melt by the heat and moysture of the meat, that they will seem all bloody; and he will loath and refuse them. Any man may eat them without any rising of his stomack. If you cut Harp-strings small, and strew them on hot flesh, the heat will twist them, and they will move like worms.

THE

THE FIFTEENTH BOOK OF Natural Magick:

Shews to catch living Creatures with your hands, and to destroy them.

The Proeme.

VVE shall speak of Fawkning, that most men, and especially great men, delight in. If you will catch living creatures, they are taken by force, or by craft. They are taken by craft, and killed. But how that may be done, shall be taught in Philosophy, that shews the Nature and manners of living Creatures: For it is easie, when you know their Natures and their Manners, cunning may find ways to allure and take them. First, I shall teach how to allure and take them, by meat, whistle, light, smell, love, and other frauds; or else to make them drunk, and take them, or to kill them with venome. I shall set down examples.

Chap. I.

With what meats divers sorts of Animals are allured.

There is nothing that more allures and draws on Animals, then meat and pleasure, and love. Wherefore from these shall I begin. They follow meat for necessity; unless they would dye for hunger, they mu† search for that: But divers Creatures feed on divers meats, and some of them feed on particular diet; and you may guess at the rest thereby by your own reason.

The bait for a Sturgeon, or Whale-fish.

Sturgeons or Whales are allured with the Lungs of a Bull rosted, hung upon a line with a hook, cast into the sea; the Sturgeon presently smels it, and being greedy of it, presently swallows it down, and is caught with the hook: Oxen draw him to the shore. *Ælian.*

A bait for a Sargus.

The Sargus loves Goats exceedingly, as we shall shew, and hunts after the smell of them Wherefore the Fisher-man wets his paste in Goats blood, and casts it into that part of the sea where they haunt; and they are drawn thither by the sent of it, as by a charm, and are catched with the hook. Moreover, if men fasten to the hook the bait that is made of a Mouse fish salted, and move this gently in the sea, the Sargi will come to it exceedingly, and gather about the hook for the love of it, and are easily caught by their greediness after the meat.

A bait for Thymalus.

Ticinus a River in Italy produceth a fish called Thymalus, that is not taken with the dainty baits that other fish are, but onely with the Gnat, an enemy to man; and she delights in no other bait.

The bait for an Aulopius.

Coracini, blackfish, whose heads shine like Gold, allure the Aulopii; when they observe some such dainty food, and they come to it rejoycing.

A

A Bait for Summer-whitings.

The Bait is made of the Purple fish; for this is bound fast to the line, and this makes them swim to the Bait, because they love it; and when any one of them by greediness lays hold of the Bait, the rest will run after, and catch hold of the hooks, that for number you shall hardly draw them to you, so many will be hanged together by several hooks.

Bait for an Eel.

Eels lie in their holes; and the mouthes of their holes being smeered in the ponds with some odoriferous things, they are called forth as other Fish are. *Aristotle.* Yet *Pliny* saith false, that they are not allured, but driven away by the sent of dead Eels. *Opianus* wittily saith, they are allured with garbage. Would you know

A Bait for Mullets.

Because the Julides are a Bait almost for all Fish, or your groundlings or little Sea-squils; therefore they are a part of all Baits. Or, take of the Liver of the Tuny Fish, four drachms; Sea-squils, eight drachms; Sesamum-seed, four drachms; Beans ground, eight drachms; of raw Dog-fish, two drachms: pown all these, and make them up with new Wine distilled into balls, for good Baits. This is

A Bait for all Fish.

Tarentinus teacheth us this for all Fish: Take of the strong Whale, eight drachms; yellow Butterflies, Anniseed, Cheese of Goats Milk, of each four drachms; of Opoponax, two drachms; Hogs blood, four; as much Galbanum: pown them all, and pour on sowre Wine: make cakes, and dry them in the Sun.

Chap. II.

How living Creatures are drawn on with the baits of love.

There are two Tyrants that rule over brute Beasts, meat, and pleasure or love; not smell, not sound, nor fumes; nor do other things allure their minds besides love: that we may say of wilde Beasts as well as of man, Wanton love can do any thing with mortal Creatures. If we will

Take Cuttles with the bait of love;

To take Cuttles there needs neither wheels nor nets; but you may catch them thus, with baits of love, to trail the Female Cuttle; and the Male seeing it never so far off, swims presently after, and fasteneth close about her; and whilst they thus embrace, the Fishers cunningly take them up.

To catch a Pollard or Cupito.

Ælian saith, that in the Grecian Gulph, the sharp-sighted Cupito is; but I have seen them taken in the Adriatick Sea by the fury of love. The Fisher bindes the Female either to a long fish-pole, or to a long rope; but she must be fair and fat: for the Male cares not for one that is lean: so is he drawn to the shore: or, he follows the net; and you must observe how to lay hold of him: for when the Female is drawn, the Males swim after her, being furiously in love; the Fisherman casts in his net, and takes them.

To catch a Scarus or Gilthead.

The Scarus of all Fish is the most lascivious, his unsatiable desire of the Female, is the cause that he is taken; cunning Fishermen that know this, lay snares for him thus: They catch the Female, and tie the top of her mouth to a rope, and they draw her alive through the Sea in such places as they haunt: the Males are mad with lust when they see her, and strive to come at her, and use all such means as lovers do: but when they come neer the net, the Fisher draws in the Female, and the Males swimming in after her, are catcht. *Opianus.*

To catch Elephants.

There is a Pit made to catch Elephants, and four Females are put in to allure the Males; the Males come, and enter into the Pit: but those that lie in wait, pull away the Bridge, and so they have the Elephants fast. *Ælian.*

To catch a Nightingale.

The Female Nightingale is shut in a Cage, the Fowler counterfeits their note; the Males come when they hear it; and seeing the Female, the Male flies about till he fall into the net.

CHAP. III.

Also other Animals are called together by things they like.

ALso, some Animals by Sympathy, are drawn by the love of some things, or of some other Creatures, which he that lays snares observing, useth such meats for them, that whilst they follow what they love, they may fall into the snares. If you would know how

To catch a Sargus;

It is a mad way to catch them. The Sargi love Goats unmeasurably; and they are so mad after them, that when so much as the shadow of a Goat, that feeds neer the shore, shall appear neer unto them, they presently leap for joy, and swim to it in haste; and they imitate the Goats, though they are not fit to leap: and thus they delight to come unto them. They are therefore catch'd by those things they so much desire. Whereupon, the Fisher putting on a Goats skin with the horns, lies in wait for them, having the Sun behinde his back, and paste made wet with the decoction of Goats flesh: this he casts into the Sea where the Sargi use to come; and they, as if they were charmed, run to it, and are much delighted with the sight of the Goats skin, and feed on the paste. Thus the Fisherman catcheth abundance of them. *Ælian. Opian* doth elegantly describe it thus:

The Sargi doth run mad for love of Goats.

And a little after,

The cunning Fisher hid in a Goats skin,
Makes two Goats horns unto his temples fast;
His bait mix'd with Goats blood, he doth within
The Sea let loose. The Sargus comes in haste:
For of the bait he deerly loves the smell,
And the Goats skin doth tole him on as well.

How to catch Partridge.

Partridge love Deer exceedingly, and are cosened by their skin. Thus: If a man put on a Deer's skin, and the horns upon his head, and come closely to them; they supposing it is a Deer indeed, will entertain him, and draw neer to him; and will not flie away; and embrace him as much as one would do a Friend, come from a long journey: but by this great friendliness, they get nothing but nets and snares.

Catching of Bustards.

Bustards of all Birds are thought to be most in love with Horses; and it appears, because they cannot endure other living creatures, but when they see a Horse, they will presently flie to him, with great joy, and come neer to him. If a man put on a horse skin, he may catch as many as he please; for they will come neer for love of the horse. So almost are

The

The Polypi or Pourcontrels taken.

The Polypi take delight in the Olive-tree, and they are oft-times found fastned with their claws about the body of it: sometimes also, they are found clapping about the Fig-tree that grows neer the Sea, and eating the Figs, saith *Clearchus.* Wherefore Fishers let down an Olive-bough into the Sea, where the Polypi use to be. In short space, without any labour, they draw up as many Polypi as they will. *Opian* handsomely describes it thus:

The Polypus doth love the Olive tree,
And by the speckled leaves ('tis wonder) he
Is catch'd.———

Again,

He is enraged for the Olive-bough,
The wary Fisher doth by this know how
To catch this Fish: for he doth binde about
A piece of Lead, an Olive-branch throughout:
The Fish lays hold, and will not let it go;
He loves it, and it proves his overthrow.

Chap. IV.

What noises will allure Birds.

NOt onely love, but noises and Musick will draw them: and each creature delights in some special noise. First,

The Dolphin loves the Harp.

And with this Musick is he most delighted, as also with the sound of the Organs. Hence *Herodotus* first, and others from him, report, that *Arion* was carried to Tenarus on a Dolphins back: for when the men of Corinth cast him into the Sea, he begged that he might have his Harp with him, and might sing one song as he was thrown in. But a Dolphin took him, and brought him to Tenarus. *Opian.*

A Wolf is charmed by a Minstrel or Flute.

A Minstrel at Pythiocara, when he sang and played very pleasantly, he made the Wolves tame. *Ælian.*

Horses delight in the Musick of the Flute.

The Horses of Lybia are so taken with the noise of the Flute, that they will grow tractable for mans use thereby, and not be obstinate. Shepherds make a Shepherds Pipe of Rhododaphne; and by piping on this, they will so delight Horses, that they will run after them: and when the Shepherds play on, the Horses will stand still, and weep for joy. *Euripides* saith, that Shepherds provoke Mares to take Horse, by playing on a Pipe; and the Horses are so provoked to back the Mares.

Stags and Bores are taken with a Pipe.

It is a common saying among the Tyrtheni, that Bores and Stags are taken most with them by Musick: which so comes to pass. Nets being pitch'd, and all things made ready for to ensnare them, a man that can play well on the Flute, goes through dales and hills, and woods, and plays as he goes, neer their haunts: they listen exceedingly after it, and are easily taken by it: for they are so ravished, that they forget where they are. And thus by delight they fall into the snare, and are taken. *Ælian.*

The Pastinaca is taken by dancing and Musick.

When the Fisherman sees the Pastinaca, or Ray, swimming, he leaps ridiculously in his

his Boat, and begins to play on the Pipe: the Pastinaca is much taken with it, and so comes to the top of the water, and another lays hold of him with his Engine.

Grampels by Musick are enticed on land.

Fishermen catch Grampels by Musick: some lie hid, others begin to play with the Pipe: when the Grampels hear the Musick, they presently come forth of their holes, as if they had been charmed; and they are so ravished, that they will come out of the waters. These go back and play on the Pipe, the others run and catch them on dry Land.

CHAP. V.

Fishes are allured by light in the night.

AMongst the many Arts to deceive Animals, Light is one: for at night, when some Fish rest, Fishermen carrying Light in their Boats, draw these Fish to them, and so strike them with a three-forked Spear, or catch them alive. Which *Opian* knew.

Either at noon, or when the Sun doth set,
Are Fishes caught, or else in the dark night,
By burning torches taken in the Net;
For whilst they take such pleasure in the Light,
The Fisherman doth strike them with his dart,
Or else doth catch them then by some such Art.

Many men have been much troubled how to make a Fire or Light under Water, that Fishes seeing it afar off, might swim to it. I have done it thus: I made a Pillar of Brass or Lead, three or four foot diameter: it was sharp or pyramidal below, that it might sink the better into the deep; and it was bound about with iron hoops, that being sunk by its weight, it might be drawn under the water: I set on the top a Pipe that was fifteen or twenty foot long, and one foot broad. The middle of this Pillar had many open windows, five or six, and these were Glass-windows, well polished and fitted to them, and the joynts were well glued with Pitch, that no water could come in. I sunk the Pillar by its weight in a place fit for it; but the mouth of the Pipe stood at least two foot above water: then I let down a lighted Candle into the belly of the Pillar by the Pipe, with a cord: and it was so provided, that what motion soever it had, it should always stand upright. The Light passed through the windows into the waters, and by reflection made a Light that might be seen under water very far: to this Light, abundance of Fish came, and I catched them with Nets.

CHAP. VI.

That by Looking-Glasses many Creatures are brought together.

IF Females be wanting, Looking-Glasses may serve to make reflexion of themselves; so these Creatures, deluded by their own pictures, are drawn thither. Also Liquors may serve in stead of Glasses.

The Cuttle is taken with a Glass.

Glasses put into wood are let down by a cord by the Fishermen into the waters; and as they flote, they are drawn by degrees: the Cuttle seeing himself in it, casts himself at his own image; and laying fast hold of the wood with his claws, whilst he looks upon his own picture as enamored by it, he is circumvented by the Net, and taken.

A Jackdaw is taken with a Looking-Glass.

Jack-

Jackdaws love themselves: the Fowler following to take them, invents such wayes; for where he sees they flock, there he sets a Bason full of Oyl; the curious Bird coming thither, sits on the brim of the Vessel, looking down to see her own Picture; and because she thinks that she sees another Jackdaw, she hastens to flee down, and so falls into the Oyl, and the thick Oyl sticks to her, and so she is catched without snares or nets.

How Quails are taken with a Looking-Glass.

Clearchus saith, that Quails spend their seed not only when they see the Females, but when they hear their cry also. The cause is the impression in their mindes, which you shall know when they couple, if you set a Looking-Glass against them, and before that a Gin: for running foolishly to their picture in the Glass, they see they are catcht. *Atheneus* and *Eustathius*.

CHAP. VII.

How Animals are congregated by sweet smells.

THere are many odours, or other hidden qualities, that gather Animals together, from the particular Nature of things, or of living Creatures. I shall speak of the smelling odours and other aliments that they much desire. As,

The Unicorn is allured by sent.

Tretres writes, that the Unicorn so hunts after young Virgins, that he will grow tame with them; and sometimes he will fall asleep by them, and be taken and bound. The Hunters clothe some young lusty Fellow in Maids clothes; and strewing sweet odours on him, they set him right against the place where the Unicorn is, that the winde may carry away the smell to the wilde Beast: the Hunters lie hid in the mean time. The Beast, enticed with the sweet smell, comes to the young man: he wraps the Beast's Head in long and large sleeves: the Hunters come running, and cut off his Horn.

To make Wheezles come together.

The Gall of a Stellio beaten with water, will make Wheezles come together, saith *Pliny*. Also, the wise Plinianists write, that with the Gall of a Chamælion cast into water, Wheezles will be called together.

To make Mice come together.

If you pour thick lees of Oyl into a Dish, and set it right in the house, they will stick to it. *Palladius*. But *Anatolius* saith, if you pour Oyl-Lees into a Brazen Bason, and set it in the middle of the house, all the Mice at night will meet together.

To make Fleas come together.

The fat of a Hedge-hog boyl'd in water, and taken off as it swims on the top; if you anoynt a staff with it, and set it in the house, or under your bed, all the Fleas will come to it. *Rhasis*.

To bring Frogs together.

The Gall of a Goat set into the earth in some Vessel, is said to bring all the Frogs together, if they can finde any delight therein.

CHAP.

CHAP. VIII.

How Creatures, made drunk, may be catch'd with the hand.

I Have said what draws them, now I shall say what will make them drunk. There are many simples that will do it, that you may take them with your hands, whilst they sleep: and because there are divers Animals that are made drunk with divers things, I shall speak of them in order. And first,

How Dogs are made drunk.

Athenæus saith, that Dogs and Crows are made drunk with an Herb called Ænutra: but *Theophrastus*, from whom he had it, saith, that the Root Ænothera, given with Wine, will make them more tame and gentle. Whence Ænutra comes, by corruption of the word. *Theophrastus* his Ænothera is Rhododaphni, as I said. So

Asses are made drunk.

And when they sleep, they are not onely taken; but, if you pull off their skins, they will scarce feel you, nor awake; which comes by Hemlock: for when they have eaten that, they fall so fast asleep, that they seem stupid and senseless. So

Horses are made stupid

by Henbane seed, if you give it them with Barley; and they will be so fast asleep, that they will be half dead, half a day. A certain Cheat, who wanted money on his way, cast this seed to some of his company; and when they lay almost dead asleep, and they were all much troubled for them, for a reward he promised to help them; which received, he put Vinegar to their Nostrils, and so revived them. Whereupon they went on their journey. So

Libards are made drunk.

Opian teacheth the way, and how they are taken when they are drunk. In Africa, so soon as they come to a Fountain where the Libards use to drink every morning, there the Hunters in the night bring many vessels of Wine: and not far from thence, they sit covered in blankets. The Libards, very thirsty, come to the Fountain, and so soon as they have drunk Wine, that they delight in, first they leap, then they fall fast asleep on the ground; and so they are easily taken. If you desire to know how

Apes are taken, being drunk;

Athenæus writes, that Apes will drink Wine also; and being drunk, are catch'd. And *Pliny* saith, that four-footed Beasts, with Toes, will not encrease, if they use to drink Wine. So

Sows run mad,

eating Henbane-seed. *Ælian* saith, that Boars eating this Herb, fall sick of a lingring disease, and are troubled: it is of the Nature of Wine that disquiets the minde and head. So

Elephants are made drunk.

Athenæus reports out of *Aristotle*'s Book *de Ebrietate*, that Elephants will be drunk with Wine. *Ælian* writes, that they give the Elephant that must go to war, Wine of the Grapes, and made Wine of Rice, to make them bold. Now I will shew how Birds laid asleep, may be catch'd with your hands. If then you would know how

Birds may be catch'd with hands;

Pliny writes, A certain Garlick grows in the Fields, they call it Alum, which being boyled,

boyled, and cast to them, is a remedy against the villany of Birds that eat up the Corn that it cannot grow again: the Birds that eat it are presently stupid, and are catch'd with ones hand, if they have staid a little, as if they were asleep. But if you will

Hunt Partridge that are drunk,

Boetius teacheth you thus: You shall easily hunt such Partridge, if you cast unto them meal wet in wine: for every Bird is soon taken with it. If you make it with water and wine mingled, and put that which is stronger into the vessels, so soon as they have but sipt a little, they grow drowsie and stupid. He sheweth,

How to take Ducks with your hand.

If any one observe the place where Ducks use to drink; and putting away the water, place black wine in the place: when they have drunk, they fall down, and may be easily taken. Also, wine-lees is best.

Ducks and other Birds being drunk are soon taken

With some meats, as are the Bur Dock seed, strewed here and there in places where Birds frequent: they are so light-headed when they have eaten them, that you may take them with your hands. Another bait. Tormentil boy'ld in good wine, and boyl Wheat or Barley in the same, cast to Birds, is good to catch them: for they will eat pieces of Tormentil with the seeds, and be drunk that they cannot flie; and so are they catc'd with your hands. This is best when the weather is cold, and the Snow deep. Or else strew Barley corns in places where many Birds come, then make a composition like a pultis of Barley-meal, Ox-gall, and Henbane-seed; set this on a plank for them: when they have tasted it, the Birds will be so stupid, that they cannot flie, but are catch'd with ones hand. Or mingle Barley, and mushrooms, that are so called from flies, with the seeds of Henbane, and make the pap of it, and lay on a board, as before.

To catch Rooks with your hands.

Powder *Nux vomica*, and mingle it with flesh. So also you may make Fish drunk. *Opian* teacheth some ways. If you will

Make Fish drunk,

Sow-bread will do it: for I said, that Sow-bread will make men more drunk. His words are:

Of Sow-bread-Root, they make a paste that's white
And fat, with which the rocks and holes they smeer;
The water's poyson'd by it, and the might
And force thereof doth spread both far and neer.
The Fishes fall, the Fishes are made blinde,
And tremble at it: for the stinking smell
This Root thus ordered, alwayes leaves behinde,
Doth make them drunk, as Fishers know full well.

Chap. IX.

The peculiar poysons of Animals are declared.

Do not think I mean, that one poyson can kill all living Creatures, but every one hath his several poyson: for what is venome to one, may serve to preserve another; which comes not by reason of the quality, but of the distinct nature. Would we mention

The venoms that kill Dogs.

Di-

Dioscorides saith, that white Chamæleon made up with Barley-Flour, will kill Dogs, Sows, and Mice, being wet with water or Oyl. *Theophrastus* saith, Dogs and Sows kneaded with water and Oyl: but with Coleworts Sows. Nux vomica, which from the effect is called Dogs Nut, if it be filed, and the thin filings thereof be given with Butter or some fat thing to a Dog to swallow, it will kill him in three hours space; he will be astonished, and fall suddenly, and dies without any noise: but it must be fresh, that Nature seems to have produced this Nut alone to kill Dogs. They will not eat the Fruit of the Ash, because it makes pain in their back-bone and hips: yet Sows are fatted by it So there is one Plant, called Dogs bane. *Chrysippus* saith, that Dogs are killed with it, if the shoots of it are given to them with water. Dogs cole, or wilde cole, if it be given with Flesh; so the fumes of Lead. *Aristotle* in his wonders, concerning the Country of the Scythians and Medes, saith, that there is Barley that men feed on; but Dogs and Sows will not endure the Excrements of those that eat it, as being poyson to them. I say nothing of Aconitum, called by *Dioscorides*, Dogs bane. I shall say the same

Of Wolfs bane.

Wolfs bane kills Wolfs and many other wild Beasts; and it's so called from the effect. Mountebanks make venome thus: Take black Hellebore, two ounces; Yew-leaves, one ounce; Beech-rinde, Glass, quick Lime, yellow Arsenick, of each one ounce and half; of sweet Almonds three ounces; Honey what may suffice. Make pellets, as big as a small Nut. Others take Wolfs bane, yellow Arsenick, and Yew-leaves, of each alike, and mingle them. There are other Herbs that kill Wolfs: but I pass them, to avoid tediousness. *Ælian* saith, By Nilus grows an Herb called Wolfs bane; if a Wolf tread on it, he dies of convulsions. Wherefore the Egyptians forbid any such Herb to be imported into their Country, because they adore this Creature. There are also

Herbs that kill Mice.

That Aconitum, which is called Myoctonon, kills Mice a great way off. *Dioscorides* and *Nicandor*. Staves-acre hath almost the same forces, whose Root or Seed in powder, mingled with Meal, and fried with Butter, kills Mice if they eat it. They are driven away with the Root of Daffodils; and if their holes be stopt with it, they die. The wilde Cucumber, and Coloquintida, kill Mice. If Mice eat Tithymal, cut into small slices, and mingled with Flour and Metheglin, they will be blinde. So Chamæleon, Myacanthus, Realgar, namely, of live Brimstone, quick Lime and Orpiment will do the same. But amongst

Wolfs banes,

is reckoned Libards bane, by whose Root, powdered, and given with flesh, they are killed. Flesh is strewed with Aconite, and Panthers are killed if they taste thereof. Their jaws and throat are presently in pain: therefore it is called Pardalianches. They are killed also by Dogs bane, which also they call Pardalianches.

Lions bane

is called Leontophonon: it is a little Creature that breeds nowhere but where the Lion is. Being taken, it is burnt: and with the Ashes thereof, flesh is strewed; and, being cast in the high-ways where they meet, Lions are killed: so Pardalianches kills Lions as well as Panthers.

Ox bane.

The juice of black Chamæleon kills Heifers by a Quinsey: wherefore some call it Ulophonon. Oxen fear black Hellebore, yet they will eat the white.

Goats bane.

There is an Herb, that from killing Beasts, but especially, Goats, is called Ægolethros. The Flowers of it, in a watry Spring-time, are venome when they wither;

wither; so that this mischief is not found every yeer.

Harts bane.

Some venemous Fish are found in Armenia; with the powder of them, they scatter Figs strewed with it, in the places where wilde Beasts come: Beasts no sooner taste of them, but they die. And by this Art are Harts and Bores killed. *Ælian.*

Horse banes,

are Aconite, Hellebore, and red Arsenick.

Wheezles bane, are

Sal Ammoniac, and Corn moystened with some Liquor: scatter this about such places as Wheezles haunt: when they eat it, they die, or flie away.

Sheeps bane.

Nardum kills Sheep. *Dioscorides.* Cattel and Goats, if they drink the water where Rhododendron is steeped, will die. *Pliny* and *Ononymus*, an Author nameless. Fleabane kills Goats and Sheep: so doth Savin.

Pigeons bane.

Serapio writes, that Pigeons are killed when they eat Corn or Beans steept in water, wherein white Hellebore hath been infused.

Hens bane.

Hens die by eating the Seeds of Broom, called Spartum.

Bats bane.

Zoroastes in *Geopon.* saith they die by the fume of Ivy.

Vultures.

Some Animals are killed by things that smell very sweet to us: Vultures by Unguents, and black Beetles by Roses. The same happens if a man do but anoynt them, or give them meat that is smeered with sweet Oyntment. *Aristotle lib. Mirabil.*

Scorpions bane.

Aconite called Theliphonum, from killing Scorpions. Scorpions are stupified by touching it, and they wax pale, shewing that they are conquered. The Eagle is killed with Comfrey: the Ibis with the Gall of the Hiæna: the Stare with Garlick-seed: the Charadrius with Brimstone: the Urchin with Pondweed: the Faulcon, the Sea-gull, the Turtle, the black-Bird, the Vulture, the night-Bird, called Scopes, perish with Pomegranate Kernels. The Titling by the Flower of Willows: the Crow with Rocket-seed: the Beetle with sweet Oyntment: the Rook with the reliques of flesh the Wolf hath fed on: the Lark by Mustard-seed: the Crane by the Vine-juice.

Chap. X.

Of the venomes for Fishes.

The Sea and Rivers use to be infected with some Herbs, and other simples whereby the Fishes that swim in those waters, are made drunk and die. But, because they are several for several Fish, I shall set down both the Particulars and the Generals, that the Fisherman taught by these, may invent others himself.

Fishes are killed,

saith *Pliny*, by the Root the Fishers of Campania use, called, round Birth-wort;

called

called also the venome of the Earth. This Root they bruise, and mingle it with Lime, and cast it in to the Sea: the Fishes come to it with great delight, and are presently killed, and float on the waters. *Dioscorides* saith, that broad leaved Tithymal, bruised and strewed in the waters, kills Fish. We use now to bruise the Roots of it, and with a weight let them down to the bottom of the waters, that will be infected by them, and kill the Fish presently. But in the Sea, we shall sooner kill them thus: Mingle Oriental Galls, two drachms; Cheese, one ounce; Bean-meal, three ounces, with *Aqua Vitæ*; make pellets of these as big as Chick-peason. Cast them into the Sea, in the morning before Sun rise: after three hours, come to the place again, and you shall finde all those that tasted of it either drunk or dead, and to appear either on the top or bottom of the Sea; which you shall take up with a pole and a hook fastened to it, or Fish-speer. The *Aqua Vitæ* is added, because it soon flies to the head. The Oriental Galls are poyson that astonisheth them: the Bean-meal is not of great concernment. This bait invites them; and the Cheese smells so, that they sent it at a distance.

CHAP. XI.

Of other Experiments for hunting.

NOw I will add some Experiments that seem to be requisite, that you may use for necessity when you please.

To change a Dogs colour.

Since white Dogs are seldom fit for hunting, because they are seen afar off; a way is found to change his colour, that will be done if you boyl quick Lime with Litharge, and paint the Dog with it, it will make him black.

That a Dog may not go from you.

Democrites saith, a Dog will never run from you, if you smeer him with Butter from head to tail, and give him Butter to lick. Also, a Dog will follow you if you have the secondine of a Bitch close in a bag with you, and let him smell to it. If you would not have

Your Dog to bark;

If you have a Bitches second Membrane, or a Hares hairs, or Dung, or Vervain, about you. In Nilus there is a black stone found, that a Dog will not bark if he see it: you must also carry a Dogs Tongue under your great toe within your shooe, or the dry heart of a dog about you. *Sextus.* Or, the hair of a Hare, or the Dung. *Pliny.* Or cut off the tail of a yong Wheezel, and put it under your feet: or give the Dog a Frog to eat in a piece of meat. All these things are to keep Dogs from barking. *Nigidius* saith, that Dogs will all day flie from him who pulls off a tick from a Sow, and carrieth it a while about him. *Opian.*

If of Hyænas skin a piece you take,
And wear it, all the dogs will you forsake;
As frighted they will flie, and nevermore
Bark at you, though they barked much before.

That a Dog may not run.

If you anoynt him with Oyl under the shoulders, he cannot run.

To make a Hawke couragious.

You shall animate your Hawk against the prey, that he may assail and flee at great Birds. When you hawk, wet the Hawks meat with Wine. If it be a Buzzard, add a little Vinegar to it when you would have him flie: give him three bits of flesh

wet in wine: or, pour Wine in at his mouth, with a yong Pidgeon: so let him flie.

To make Partridge more bold to fight.

Give them Maidenhair with their meat. *Pliny.*

That dung-hill Cocks may fight the better.

Give them Garlick to eat soon before they fight: whence, in the old Comedy, a Cock ready and earnest to fight is wittily called ἐσκοροδισμένος, fed with Garlick.

That a Bird may not flie high.

Take out the Feathers of his tail, that make him flie upwards; so he will whirl about, and flie downward. If you will have

That a Bird shall not flie,

cut the upper and lower nerves of his Wings, and it will not hurt him; yet he cannot flie out of your Bird-cages, or places you keep them in.

THE SIXTEENTH BOOK OF Natural Magick:

Wherein are handled secret and undiscovered Notes.

The Proeme.

I Make two sorts of secret marks, which they vulgarly call Syfers; one of visible marks, and is worthy of a treatise by it self: another of secret marks, whereof I have attempted to say something in this present Volume, and what are the consequents thereof, for the use of great Men, and Princes, that take care for things absent, and write to some man that knows the invention. I shall set down plainly some examples: but these things and the consequences of them must be faithfully concealed, lest by growing common amongst ordinary people, they be disrespected. This is that I shall publish.

Chap. I.

How a writing dip'd in divers Liquors may be read.

There are many, and almost infinite ways to write things of necessity, that the Characters shall not be seen, unless you dip them into waters, or put them neer the fire, or rub them with dust, or smeer them over. I shall begin with them that are read by dipping them into waters. Therefore

If you desire that letters not seen may be read, and such as are seen may be hid,

Let Vitriol soak in boyling water: when it is dissolved, strain it so long till the water grow clear; with that liquor write upon paper: when they are dry, they are not seen. Moreover, grinde burnt straw with Vinegar; and what you will write in the spaces between the former lines, describe at large. Then boyl sowre Galls in white Wine, wet a spunge in the liquor: and when you have need, wipe it upon the paper gently, and wet the letters so long until the native black colour disappear; but the former colour, that was not seen, may be made apparent. Now I will shew in what liquors paper must be soaked to make letters to be seen. As I said, Dissolve Vitriol in water: then powder Galls finely, and soak them in water; let them stay there twenty four hours: filtre them through a linen cloth, or something else, that may make the water clear, and make letters upon the paper that you desire to have concealed; send it to your Friend absent: when you would have them appear, dip them in the first liquor, and the letters will presently be seen.

That dipping a linen rag in water, the letters may appear.

Dissolve Alom in water, and with it make letters upon white linen, sheets, napkins, and the like; for when they are dry, they will presently vanish. When you will have them visible, soak them in water, and the linen will seem to be darkned: but only where the Alom hath written, it will not: for the letters will grow so clear, that you may read them: for where Alom, Vitriol, and all astringents are dissolved, those parts will admit water last. So

White letters are made with waters.

Li-

Litharge is first powdered and cast into an earthen pot that hath water and vinegar mix'd; boyl it, and strain it, and keep it: then write letters with Citron Lemons juce: these are added to them when they begin to dry. If you dip them in the liquor kept, they will appear clearly and very white. If womens brests or hands be wet in it, and you sprinkle the said water upon them, they will grow white as Milk. Use it. If at any time you want these, if you please,

A stone dipped in vinegar will shew the letters.

Make letters with Goats fat upon a stone; when they are dry, they will not be seen. If the stone be dipt into vinegar they presently come forth, and seem above the stone. But if you would have letters writ with water only, appear black, that you may the better be provided, and more speedily for a voyage; beat Galls and Vitriol finely, and strew this powder on your paper: rub it with a cloth, and polish it well, that so it may stick fast to the paper, and be like it. Powder Juniper-gum, which Scriveners call Vernish, and add it to the rest: when you would use it, write with water or spittle, and they will be black letters. There are many such Arts, too tedious to relate.

Chap. II.

How letters are made visible in the fire.

I Shall shew the ways how letters are not made visible but by fire; or not, unless light interpose, or may be read when they are burnt. But

To make letters visible by fire.

So we may bring forth letters written between the verses, and in the close setting together, or larger distances of syllables. Let the Epistle contain some void space, that the letters may not be seen; and if this be intercepted, it will hardly be read. If you write with the juice of Citrons, Oranges, Onyons, or almost any sharp things, if you make it hot at the fire, their acrimony is presently discovered: for they are undigested juices, whereas they are detected by the heat of the fire, and then they shew forth those colours, that they would shew if they were ripe. If you write with a sowre Grape that would be black, or with Cervices; when you hold them to the fire, they are concocted, and will give the same colour they would in due time give upon the tree, when they were ripe. Juice of Cherries, added to Calamus, will make a green; to sow-bread, a red: so divers juices of Fruits, will shew divers colours by the fire. By these means, Maids sending and receiving love-Letters, escape from those that have the charge of them. There is also a kinde of Salt called Ammoniac; this powdered and mingled with water, will write white letters, and can hardly be distinguished from the paper: but hold them to the fire, and they will shew black. Also,

Letters that cannot be read unless the paper be burnt.

For the mixture will be white, and nothing will be seen; but when it is burnt, the paper will be black, and the Characters will be white: Take the sharpest vinegar and the white of an Egg: in these steep Quick-silver, and stir it well; and with that mixture make Letters on the paper; burn the paper in the fire, and the letters will remain unburnt; or make letters on the paper with Gum, or any kind of Salt or Lime; these, being they cannot be seen at the fire, when the paper is burnt and made black, they will appear white. If you will, you may

Write letters that cannot be seen but by interposition of fire.

Do it thus: Mingle Cerus, or some other white colour, with Gum Traganth, soaked, and of this mixture is made a matter of the same colour with the paper, that it cannot be discerned from it, nor cause suspicion: then this being put between the eye and the light of a candle, the eye cannot pass through where the letters are written, and you shall see them darkly. This is by reason of the Opticks: for that part of thick matter opposed against outward light, hinders it, that the rays cannot come to our sight; and so the prints of the letters are seen as a shadow.

Chap.

CHAP. III.

How Letters rub'd with dust may be seen.

NOw I will use another artifice, that Letters rubbed with dust may be read, that were before invisible, which I read was used by the Ancients: wherefore do thus:

That Letters rubbed with mill-dust may be read.

That as in paper, so on some unseen parts of the Body, Letters written may lie hid, and be opened when need is; write secretly on your Back or Arms, or other Limbs, with Vinegar or Urine, and dry it that nothing may appear: now, to have it read, rub it over with soot or burnt paper; for so the Letters will shine forth. Or,

Otherwise,

If you make Letters with Fat, Tallow or any other fatty substance, or with Gum, or Milk of a Fig-tree, and strew them with the dust of cole or burnt paper, they will appear. It may be by this craft, as *Polyænus* the Greek saith, *Attalus* used the imprinted inscription in a Beast for a sacrifice. He, to raise the valour of his Souldiers, to make them fight valiantly with their Enemies, the French, that were far more in number; supposing it would be no little advantage to put them in hopes beforehand of the assurance of the victory, invented a trivial business; but otherwise profitable, with the Priest that was to offer the sacrifice. Before the day they were to fight, he prepares for the victory: for *Sudinus* the Southsayer, being to offer sacrifice, pray'd unto the gods, and cuts the Sacrifice in two. But the King used powdered Gum, and from the right to the left side, he drew these words: *Regis Victoria*, The Victory is the King's: and when the Entrails were drawn forth, he thrust his hand into the hottest and most spungy place, and wiped clean the inscription. But the Augur, changing the other parts, and doing his Office, turns the part where this inscription was contained, *Regis Victoria*. This matter was no sooner published, but the Souldiers generally rejoyced, and shouted exceedingly, to shew how ready they were to fight; so going on with a certain assurance of the Victory, and depending on this promise from the gods, they fought couragiously, and subdued the French. But to the matter. Milk of the Fig-tree will do the same, if it be written on white paper, and afterwards sent from a friend, be rubbed with cole-dust strewed upon it, and made clean again, so will the Letters presently appear black. *Pliny* saith, the Milk of Tithynals will do the like, to make the Letters, and dust strewed on them to scowre them: and thus women, as he says, had rather speak with Adulterers, then by Letters. *Ovid* confirms this, admonishing Maids in his *Arte Amandi*, how they may safely write to their Sweet-hearts.

Write with new Milk, it's safe, unseen, but read
The writing with cole-dust laid on full-right:
Moyst flax will write as if that none had been,
And letters on your paper pass the sight.

Also there is an Art that one would not imagine, to write upon Chrystal: for, being all transparent, no man will dream of it, and the letters may lie hid within. Do it thus:

That letters may appear upon Chrystal by strewing on of fine dust.

Dissolve Gum Arabick in water, or Gum Traganth, that it may be cleer; and when it is well dissolved, it will not foul the Crystal, if you write upon it, or upon a Cup or Glass; for when the Letters are dry, they are invisible. No man will imagine the fraud, if a Cup be sent to one in prison, or a Glass full of wine: when he would see the letters, rub burnt straw or paper upon it, and the letters will presently be seen. Here is another secret,

That

That letters on the paper may be read, not by fire, nor water, or any other thing, but in the dust only.

This is a secret worth knowing: dissolve Goats suet with a little Turpentine: rub the paper with this liquor, and keep it: when you would send some news to your friend, lay on the paper smeered with the fat upon a letter you would send to your friend; write upon that with an iron point, and the suet will make the characters on the letter: send this away; and if it be intercepted, no water will make the words visible, or any other Art, but only strewing dust upon it. Also you may make

That upon black paper, white letters may appear.

The reason is this: mingle the white and yelk of an Egg together, that it may be liquid as ink: with this liquor, write on the paper what words you please, and dry them: when the paper is dry, make a black colour over it, and dry it again, and send it; but that the letters may be visible, scrape the superficies of the paper with a broad iron: for so it will be, that the ink being scraped off, where the letters were, they will appear white.

Chap. IV.

How you may write in an Egg.

BEcause when prisons are shut, Eggs are not stopt by the Papal Inquisition, and no fraud is suspected to be in them, I will shew you how Letters may be writ on the upper shell and white of an Egg also: for example,

That letters may be writ on the Egg-shell.

Wrap the Egg in wax, and with an iron point make letters on it, as far as to the shell; but break it not: for if you break the shell with your iron, or point, or knife, it may be detected. Soak your Egg one night in strong water of depart, which separates gold from silver: in the morning take away the wax, and take off the Egg-shells cover, and hold the shell between your eye and the light, and the letters will be seen very clear quite through the transparent shell. The same is done with the juice of Lemmons: for it softeneth the shell; but foul it not, and you shall have your desire. Will you

That letters may be seen upon the white

yellow, and better when the Egg is boyl'd. Boyl an Egg hard and rowl it in wax, and engrave the letters on the wax with an iron point, that the marks may lie open: put this Egg into liquor with Alom and Galls powdered: then put it into sharp Vinegar, and they will penetrate; and taking off the shells, you shall see them in the white of the Egg. *Africanus* teacheth it thus: Grinde galls and alom with vinegar, till they be as thick as ink: with this write what you will on an Egg; and when the writing is dried in the Sun, put it into sharp pickle: dry it, boyl it, and take off the shell, and you shall read the writing. I put it into vinegar, and could do nothing of it. Perhaps, he means by pickle, capital lees. The cause is this: the Egg-shell is porous, and hath large holes, which is plain; for being set to the fire, it will sweat, and water will come forth; and looking at it against the light, it will shew clear: so then, vinegar being subtile, penetrates by the pores, and makes the shell tender: and when it is mingled with the Alom & Galls, it carrieth their substance with it, and makes them appear on the white; and when it is put into cold water, it is condensed, and comes to be hard as it was. But observe, it must not stay long in vinegar; for that will eat off all the shell, and will leave the Egg bare, having nothing but a thin skin to cover it: and if you put that into cold water, the shell will not come again. If you will know

How letters writ with water, may be seen in an Egg,

Dissolve Vitriol in the water, and write upon the shell, and dry it, and nothing will be seen. If you will read it, dissolve Galls in wine, and steep the Egg therein: or, write with Lime-water upon an Egg, and steep it in lye where Brasil is infused; and so the letters will seem to be of a violet-color: or, write with suet upon the shell, and steep it in water of vitriol: when it is dry, scrape off the suet, and nothing will be seen: when you afterwards steep it in the foresaid wine, white letters will appear in a black shell. I will shew,

How letters may become visible upon an Egg by the fire.

Write on the Egg with juice of Lemmons, or Onyons, or Fig-milk: when you put this to the fire, the Letters will appear yellow: and that must be done on a raw Egg: for if you boyl it, the letters will be seen.

That letters may be seen on the Egg shell by dust.

Make letters on the shell with vinegar, suet, fig-tree-milk, or of Tithymal, or with gums: when you would have them seen, rub them with cole-dust, or burnt straw, or paper, and they will seem black. There is a way

How to put a letter into an Egg.

Make your letter that you send, narrow and long, scarce broader then your middle-finger: write your minde in short characters, and with the edge of a knife, make a cut in the Egg, and break the inward skin, and put in your letter at one end by degrees: for it will easily take it in, were it ten hands breadth: then stop the cut, with lime and gum mingled, that it may not be seen, and with Cerus and gum-Traganth; for then it is impossible to discern it. But if you will have this done more neatly, put the egge in sharp vinegar three or four hours: and when you finde it soft, open the shell with the edge of your knife, put in your roll of paper: then soak it in cold water, and the shell will grow as hard as it was.

CHAP. V.

How you may write in divers places, and deceive one that can read.

I Have shewed you divers ways of writing invisible; now I come to those ways that will teach you to write letters on divers things, which though they be visible, and intercepted, yet the Readers will be deceived by their secret device. First,

How to write on a small threed.

Let us see how they did this in elder times: *Gellus noct. Attic.* relates, That when the Lacedemonians writ to their Generals, that their letters being intercepted by the enemies might not be read, invented this kinde of writing; yet it is referred to *Archimedes* to be the inventor of it. Two sticks must be made long and round, and polished with the Turners instrument; they must be equal for length, breadth and thickness. One of these was given to the General when he went forth to war; and the other was kept at home by the Senate: as oft therefore as need was, a page was rolled about the stick, as large as could contain the matter, that it might make a round volume, and the sides of it were so well joyned, that they were like a collar that exactly fitted the wood, and no chinks between: upon this collar, that thus was rolled about the stick, they writ letters overthwart, from top to bottom. The collar thus written on, being long and narrow, was taken off from the stick, and sent to the General; for they thought, if it was intercepted by the enemy, when they saw bits of letters, and syllables, and of words, so far divided, they would never discern the thing: and they were not deceived in this conjecture. For when they fell among the enemies, the enemy did not imagine any thing was writ on the collar; but let them pass, as with a thing done at all adventures, and insignificant: but he to whom it was writ, applied this band, and rolled it about, as it was at first writ upon: and then the words lay joyn'd as they should be, and so he knew the message. The Greeks call this kind of writing, σκυτάλη. *Plutarch* saith, A letter thus writ, was brought to *Lysander* by *Hellespont*. But I invented to write so with a Threed: make two small sticks alike great and round: one we give to our friend that goes far from us, and hold the other by us: let us make them stick so close together, that they may joyn, and seem to be as one, and the wood not be seen: fit the Threed as it should be, and write long-ways on the stick what you please; the broader the sticks are, the more lines will they receive. If you first steep your Threed in water wherein Alom is dissolved, the Ink will not spread, but the letters will be the clearer: then take your Threed that is about the stick, and wrap it on a heap; or to keep it the more secret, sow it upon the edges of napkins or shirts, and send it to your absent friend: for the curious watch shall discern nothing on the Threed, but some scattered points. Your friend winding the Threed about the same staff, and taking care to make the points meet at the tops and agree well, shall easily read them. I will shew,

How

How to write on Parchment, that the Letters may not be seen.

When you have writ on Parchment, put it to the light of a candle, or to the fire, and it will all crumple and run together, and be nothing like what it was; if a man look on it, he will hardly suspect any fraud. If he desires to read what is in it, let him lay it on moyst places, or sprinkle it gently with water, and it will be dilated again, and all the wrinkles will be gone, and it will appear as it did at first, that you may read the Letters upon it, without any hindrance. Now I will shew the way

How in the Sections of Books the Characters shall be hid.

When the Book is well bound, and cut, and coloured black; if we open it, and turn back the leaves, that they may be turned in, we may write at the corners of the leaves what we will: but when the Book is set back again, and the leaves put into their own places, nothing is seen or can be imagined to be writ in them; but he that would read those Letters, must set the Book that way as it was, and the Letters will be read. So may we write on fly-traps, that are made with wrinkles, and then draw them forth. If need be, we may do

The same with Cards to play with.

You may excellent well write on Cards, if you put them in some order, that one may follow the other; and some shall be upright, others turned downwards. When you have set them right together, you may write all things where they divide: mingle the Cards together again, and turn them, and nothing will be seen but some disorderly marks, if any man look curiously upon them. But he that would read them, must set them in order, and they will joyn and be read exactly. Also, we may write in white Pigeons, and other white Birds, feathers of their wings, turning them upwards; for when they return to their own places, they will shew nothing. But if they be brought to their former posture, you will read the Letters; and this is no small benefit for those that shall use them for messengers. There is a way

To hide Letters upon wood.

Any one may make Letters upon wood, and not be suspected; for they shall not be seen, but when we please. Let the wood be fleshy and soft, of Poplar, or Tile-tree, or such like: and with those iron Markers Printers use, when they make stamps upon Brass, commonly called Ponzones, make Letters in the wood, half a finger thick: then hew the wood with a Carpenters hatchet, as deep as the Letters go; when all is made plain, and equal, send the stick to your friend, or board, to him that knows the matter; he putting the wood into the water, the wood will swell out, that was beaten in with the marks, and the Letters will come forth. That we may do in wooden vessels, polished by the turner, if when they are turned, we mark the Letters on them; and then turn them again: when this is done, send it to your friend, and let him soke it in water, *&c.*

Chap. VI.

In what places Letters may be inclosed.

I Shall speak in what places Letters may be inclosed, and not be suspected; and I shall speak last of Carriers. I shall bring such examples as I have read in Antient Histories, and what good a man may learn by them. First,

How to hide Letters in wood.

Theophrastus's opinion was, that if we cut the green bark of a Tree, and make it hollow within, as much as will contain the Letters, and then bind it about, in a short time it will grow together again, with the Letters shut up within it. Thus he saith, That by including some religious precepts in wood, people may be allured; for they will admire at it. But I mention this out of *Theophrastus*, rather for a similitude,

then for to do the thing I would have, for that would require a long time. But this may be done well in dry wood, as in Firthus; the chinks fastning together with common white glew. Also the Antients used

To conceal Letters in Junkets.

I will relate the cunning of the Wife of *Polycretes*; for she, whilst in the Milesian Camps they solemnized a Solemn Feast of their Country; when they were all fast asleep, and drunk, took this opportunity to tell her brothers of it, and did thus. She desired *Diognetus*, General of the Erythrei, that she might send some Junkets to her brothers: and when she had leave, she put a leaden scrole into a cake, and she bad the bearer tell her brothers from her, that no man should eat of it but themselves. When they heard this, they opened the cake, and found the Letter, and performed the contents of it. They came upon the enemy by night, that was dead drunk at the Feast, and conquered him. Also the Antients were wont

To shut up Letters in living creatures.

Herodotus saith, That *Harpagus* sent Letters to *Cyrus*, put into the belly of a Hare whose entrails were taken out, by one that counterfeited a shepherd hunting. So

Letters may be hid in Garments.

The secret places of clothes are best, to avoid suspicion; as in your bosom, or under the soles of your feet. *Ovid* in his *Arte Amandi*, writes to this purpose:

Letters may be concealed in your brest,
Wrapt in a clowt, which way is held the best;
Or else you may under your feet provide
A place full closely Letters for to hide.

To hide Letters in your belt.

Those of Campania were wont, when they would discover any thing to the Carthaginians, and the Romans besieged them round; they sent a man that seemed to run from them, with a Letter concealed in his girdle; and he taking occasion to escape, brought it to the Carthaginians. Others carried Letters in their scabbards, and sent them away by messengers, and were not found out. But we use now adays

To hide letters in the Bowels of living creatures.

For we wrap them in some meat, and give them to a Dog, or some other creature to swallow; that when he is killed, the letters may be found in his belly: and there is nothing neglected to make this way certain. The like was done by *Harpagus*. He, as *Herodotus* saith, being to discover to *Cyrus* some secrets, when the ways were stopt, that he could do it by no other means, he delivered the letters to a faithful servant, who went like a Hunter, that had catcht a Hare; and in her belly were the letters put, when the guts were taken forth, and so they were brought to *Persis*. We use also

To shut up letters in stones.

Flints are beaten very fine in brazen Mortars, and sifted; then are they melted in a brass Cauldron, by putting two ounces of Colophonia to one pound of the powder of the stone; and mingling them, put your letters into leaden plates, and hide them in the middle of the composition, and put the lump into a linnen bag, and tye it fast, that it may be round; then sink it into cold water, and it will grow hard, and appear like a flint.

CHAP.

Chap. VII.

What secret Messengers may be used.

THe Antients used the same craft for Messengers; for they used men that should be disguised by their habits, and some living creatures besides. For

To counterfeit the shape of a Dog,

It was the crafty counsel of *Josippus*, that the Messengers should be clad with skins, and so they past the enemies guards, and were not regarded; for if they were seen, they were in the likeness of Dogs; and this was done until the enemy found out the trick, and compassed the Rampart round about. And mans curiosity was not satisfied here, till they found means for ways to pass, where the Sentinels and Scouts might not discover them; wherefore they left the land, and sent by water: But that the writing might not be spoiled in the water, as *Frontinus* saith, The Souldiers that past over the River Saltella, had leaden plates writ upon, fastned to their arms. But *Lucullus*, as the same *Frontinus* reports, that he might declare to the Cyziceni, that were besieged by *Mithridates*, that he was coming to relieve them, all narrow passages being stopt by the enemies guards, that were joyned to the continent by a small bridge, he sought a way by sea. For a private Souldier appointed for it, sitting on two bladders blown, wherein the Letters were put in two covers; and so like some sea-Monster, he swam seven miles at sea, and told of the coming of the General. So they often used

Arrows for Messengers:

But that seemed not sufficient, for they feared mens cunning, lest some chance or fraud might intercept the messenger, and the secret should be discovered, or they should be racked to make them confess. Sometimes therefore they sought a way in the Air, and used Arrows for messengers, that none might intercept them. *Herodotus* saith, That *Artabazus* and *Timoxenus* did this, when one would declare any thing to the other; for the paper was folded about the foot of the Arrow, and the feathers were put upon it, and it was so shot into the place appointed. To this appertains the example of *Cleonymus* King of the Lacedemonians. He besieging the city Trœzene, commanded many of his best Archers to shoot Arrows into several places; and he writ upon them: I come to relieve your City; and by this means he set ladders, and his Army scaled the walls and went in, and plundered the place, and destroyed it. But when *Cæsar* heard that *Cicero* besieged by the French, could hold out no longer, he sent a Souldier by night, who should shoot a Letter, fastned to an Arrow, over the wall: when he had done this, the watch found the Arrow and the Letter, and brought it to *Cicero*. In it were these words written: *Cæsar* bids *Cicero* be confident, and to expect relief. So *Cæsar* came suddenly, and slaying the enemies, relieved him. We can do it safer, and better now adays with Guns: if the matter to be sent be contained in few words, we may shoot them forth with Muskets; namely, by folding up the paper, and putting it into a case of lead, where they cast bullets, pouring upon it melted lead, but not burning hot; the paper wrapt up in the lead, we shoot away with the Powder to the place. But because the Letters are but small, we may shoot many of them in a day. The way to melt the Ball is, by putting it to a gentle fire, or into quick-silver, and it will soon melt, and the paper not be touched. I shall shew now

How to make Pigeons your Messengers.

We may use Birds for Messengers; as Pigeons, Swallows, Quails, and others: For these Birds carried to other places, when need is, if you bind Letters to their necks or feet, they will return with them: and when any thing was suddenly to be related, the Antients sometimes used these Messengers. *Hircius* being Consul, as *Frontinus* testifies, sent forth Pigeons from the neerest place he could from the walls, which had been long shut up in the dark, and half famished, to *Decimus Brutus*, who was be-

besieged at Mutina by *Anthony*. They being glad of light, and desiring meat, flew and sat upon the highest parts of the houses; *Brutus* catcht them, and so was confirmed how things were: wherefore, always laying meat in those places, he call'd them back again. Hence *Pliny*. Nor Ramparts, nor Scouts, nor Nets pitch'd before Rivers, did profit *Anthony*; for the Messenger went through the Air. By the same way, in the very same day, from *Olympia* to *Ægina*, was the victory of *Taurosthenes* declared to his Father; though others say it was foreseen: others say, That *Taurosthenes*, when he went forth, took a Pigeon from her yong ones, yet weak and not able to fly, and as soon as he had conquered, he sent her back again, purple-coloured; and she making great hast to her yong ones, flew that very day from Pisa to Ægina. *Ælian* writes this. Some have sought to do this by Swallows, taken out of their nests from their yong, and sent back again. Some also attest, that beyond sea Eastward, there are Pigeons that when the way is stopt, will fly through the midst of the enemies, and carry Letters under their wings, a very long way. It may be *Juvenal* meant this, when he said,

As if from divers parts a letter were
Brought with a doufful wing quite through the Air.

Also in old Monuments and Histories it is declared, that there was a King of Egypt, whose name was *Marrhes*, who bred up a tame Rook, and this he made use of for a winged messenger, so oft as he had need: for, as if she had reason, she would carry the Letter where she was directed; for she was so crafty, as to be instructed whither to fly, and where to stay, or rest at any time. Mans wit hath invented these shifts to avoid danger; but by the same craft is he wounded sometimes, as it were with his own weapons. When the Christians with an Army besieged *Ptolemais*, when *Saladine* had appointed a Pigeon to be sent thus with Letters to the besieged, to wish them to be constant, and expect his coming suddenly; the Christians catch'd her, and tied a contrary letter to her, and sent her away: whence it fell out, that they despairing of relief, yielded themselves: so there can be no certain security in humane affairs, but there may be fraud in all things. *Themistius* saith, That amongst Animals, Pigeons have the best memory, as having a clear and refined mind. Wherefore, though all other Animals make hast to their yong ones, when they are taken from them, yet none of them carried far, can come back, because their memory fails. I have seen the tryal with Pigeons. When my servant came from my Farm, he brought home some yong Pigeons taken from their dams, and he wrapt them up in a cloak as we went; and when we came home at night, they were shut up in the house; but when the morning came, they flew out of the windows; and discovering the country afar off, they took upon the wing, and flew all home again. Wherefore in *Genesis*, *Noah* sent forth a Pigeon, which returned; but the Raven returned not. For the Raven wants memory. I remember in *Plutarchs* works, what is worth relating that I read there, That by the Pigeon sent forth of the Ark, in *Deucalions* flood, was shewed, that the waters were sunk down, and the storms past. Animals that have newly brought forth yong ones, will do the same.

CHAP. VIII.

How Messengers may be sent, who shall neither know that they carry letters, nor can they be found about them.

OUr Ancestors had another Art, that could not be discovered, invented by strange craft. *Herodotus* mentions it from *Hestiæus*, who was the Author of it. He being born in Asia, when of noble place, when *Darius* ruled, when he was with the King in Persia, and would privately write to *Aristagoras* to fall from him, fearing lest if he should not do it cunningly, he should be discovered, and be in great danger, he invented this way. He shaved off his servants hair of his head, as though he meant to cure him, who for a long time had been troubled with sore eyes: and on

his

his head, with good ink, he writ letters, that contained what he menat to have done: he kept this fellow at home with him, until his hair was grown again; when that was done, he sent him away to *Aristagoras*, bidding him say, when he came to him, that he should do unto him, in shaving off his hair, as he did before: When the servant came to *Aristagoras*, to Miletum, he said what his Master bad him say to *Aristagoras*: he supposing the business not to be idle, did what he was ordered, and so read the message. The Antients found out these inventions, to send messengers with. Yet that can be no safe way, to shave off the hair, and to write letters upon the head, for the head will easily sweat, and put them out. And if the skin be pricked with a needle, this will not avoid the suspition, if he that wears the writing, be laid hold on by the way: for then is there most diligent search: for fear and necessity will make men watchful, and they are never satisfied, till they have searched every place. Sometimes they try men by fair promises, sometimes they fright them with threats; and if these will not do, they torment and torture them, to make them confess: and if this will not do, that letters may not be secretly conveyed, not onely their hose and shooes use to be searched, their clothes pluckt off, and the seams ript, but they will search their very guts; so far is it from keeping any secret upon the head, that shall not be look'd for. But I can send Letters, and write so, that it can be understood by none, but those that the letters are design'd for. And he that carrieth them never so far off, if he should be taken by the way, and examined by torments, he can confess nothing, because he knows nothing of it, and the Letter shall always remain secret. Nor will length of time, or sweat in travel, blot out the Letters; nor is it any matter if the messenger pass through Rivers, Seas, or Rain; for wet will not hurt them. What good Princes may get by this, I leave to your cogitations; for they have most need of this, when they would declare any thing to their friends, that are besieged: and oft-times upon one message, may the victory of a City or Army depend. The invention of the Antients, was partly good, and partly bad. They writ Letters on his head, which he could not read; nor would water or sweat, wash them off, because they were printed into the head: and when the hair grew out, they could not be seen. And that the messenger might be ignorant what was writ upon his head, they took occasion for it, saying, he had a pain in his eyes, that they would cure: and thus he knew not the craft they used. But this fraud seems not very secure, for one that should suspect it might shave off the hair, and find out the secret. Moreover, if the messenger were to be sent suddenly, how could he stay a moneth, till his hair were grown again? and when his skin was prickt for to make the Letters, he must needs suspect something. But let us see

How Hestiaus could make the Letters on his head indelible.

He wounded the skin with the point of a needle, or opened it with a rasor, and cast in the powder of Colophonia burnt; for so we use to make the names of Masters, upon the faces of bond-slaves, that they shall never come forth, and in time they will look green. Also

Letters may be made between the skin, that are indelible, upon any part.

You may soon do it thus: Let Cantharides steep a whole day in strong water, but sooner is it done in water of separation; then make the letters with a Pen-knife, or fit instrument, upon the upper skin of the Arm, or any other part; the flesh hurt with the moysture, will rise in blisters, and be exulcerated; so by the force of this corroding water, will there always remain the prints of white letters, and they will never be blotted out. And this is best done by *Hestiaus* secret, because the letters could not be read under the hair, whereas white letters, like milk, would be seen. But would we have them stay onely for some time, and not always, we may do it many ways. If you make letters with *Aqua fortis*, that hath eaten silver or brass, they will appear many days. So it may be done with oyl of Honey. Now I will shew

How a man may carry letters that are indelible and invisible, and unknown to him; and how to make them visible when need is.

You

You may do it thus: by writing letters on the messengers back, that he may not know of, having first given him an Opiat to make him sleep soundly, then write, and let them dry in; when he awakes, send him away, the letters dried on will not be seen: The Antients knew this. *Ovid* saith it:

Write on his back for paper: so you shall
Better conceal your purpose from them all.

But let us see whether we can write on the flesh with any liquour, that passing through Rivers and Rain, the letters may not be blotted out with any moysture, and then by strewing on of dust, may be made visible again. Write on a mans back, which shall be visible onely, by being wet with some humour, and no man can find out, unless he know the secret. If you write with water, wherein Vitriol is dissolved, with a decoction of Galls, it will be seen. If it be made very sharp, it will pierce the skin, and the letters will be delible: we may do the same with the oyl of it. Salt Ammoniac with quick Lime, or Sope, will make a blew colour. If they be rubbed with oyl of Litharge, they will appear white, with *Aqua vitæ*, or its equal, distilled vinegar, and water and Salt.

CHAP. IX.

How Characters may be made, that at set days shall vanish from the paper.

I Shall attempt to shew how letters may be written on paper, or in other matter, that shall disappear at set times: and other letters shall be made invisible, that at a time certain shall appear, not onely useful for secret marks, but for other purposes necessary for our lives. Letters that decay and vanish, may be made two ways, either with *Aqua fortis*, that eats the paper, or some decaying liquors, that will vanish with any light touch, and leave the place where they were, without any spot. I shall teach

How letters are made, that eat the paper.

If you mingle oyl of Vitriol with common ink or any other black colour, in few days by corroding the paper, or the ink it self, the letters will vanish, or in a moneth, as you put in more or less of the oyl; and this you may try before you send away your letter: If you would have it work more slowly, add but a little oyl; if faster, put in more: you may, when it is too strong, put some water to it. The same is performed, if you mix a strong lye, they call it the Capital, with your ink; for first they will be yellow, and then they will vanish. The same is done by oyl of Tartar, or Salt Alkali, or Soda, and strong water of separation of Gold; for these corrode the letters, and the paper, that nothing of the letters will appear. If you desire to know

How letters may be made, that will soon vanish;

Make them with the strongest *Aqua vita*, or use Camphir and burnt straws: for the letters in time, will decay and vanish; the tincture will fall off, when the glutinous matter is gone. Make a powder of a very fine touch-stone; for the Sandy-stone will sooner decay, that no letter shall be seen. Also it is done

Another way:

Infuse the small filings of steel in water of separation; take a treble quantity of this, and add thereto liquid Pitch, or Soot of Turpentine, to make it the blacker, and cover the vessel: grind this on a Porphyre-stone, write, and they will vanish and fall away. This secret I thought not fit to overpass, because it is the principal thing to be considered, to make tryal oft-times; for if it stay long on the paper, add more strong water to it; and if you be careful, no mark of the writing will remain. You shall do it like to this, another way. If it be good so to counterfeit: Take Chrysocolla, Salt Ammoniac, and Alom, all alike; powder them all, and put them into a Crucible,

cible, and make a strong lye of quick-lime, and laying a linnen cloth over the mouth of the vessel, that must receive it, strain it; boil it a little, mingle this with your ink, they will remain a while, but in short time the letters will vanish away. Set it up for you use. But contrarily, if you will

That invisible letters after some time, shall become visible

and shew themselves; I will give you some examples, that you may invent more thereby your self. If you write with juice of Citrons or Oranges, on Copper or Brass, and leave this so for twenty days, the letters will appear green upon the place: the same may be done many other ways, namely, by dissolving salt Ammoniac in water, and writing with it upon Brass, the place will sooner appear of verdigreese-colour.

CHAP. X.

How we may take off letters that are written upon the paper.

IF we would take letters from off the paper, or that such as are blotted out might appear again, we must use this art. As, if we would

Take letters off the paper,

or from parchment: Take *Aqua fortis*, that is it that parts gold from silver: with a pensil wipe some of this upon the letters, it will presently wipe off letters, written with Gall and Copras. If you use *Aqua fortis*, wherein salt Ammoniac is dissolved, it will be sooner done. But printed letters are harder taken out, because that ink hath neither Galls nor Copras: Or rub it with salt Alkali and Sulphur, making little balls of them, and that will eat them out, that nothing shall be seen. But if you desire to write any thing in the place you have made clean; first, wet the place with water, wherein Alom is dissolved, for the ink will not run about. If you desire

To renew letters decayed,

or to read such as are vanished: Boil Galls in wine, and with a spunge wipe over the letters, the letters will presently be seen, when they are once wet thus, and be well coloured as they were at first.

CHAP. XI.

How to counterfeit a seal and writing.

IT may be of great use when places are besieged, and in Armies, and affairs of great men, to know how to open letters, that are sealed with the Generals Seal, and signed with his Name, to know what is contained within, and to seal them again, writing others that are contrary to them, and the like. I will shew how

To counterfeit the Seal.

Melt Sulphur, and cast it into powder of Cerus, while it is melted; put this mixture upon the Seal, but fence it about with paper or wax, or chalk, and press it down; when it is cold, take it off, and in that shall you have the print of the Seal. I will do it another way. Fill an earthen pot with Vinegar, cast Vitriol into it, and a good deal of Verdigreese; let it bubble on the fire, put plates of iron into it; after a short time take them out, and from the out-side with your knife, scrape off a kind of rust it hath contracted, that is durty as it were, and put this into a dish under it: again, put them into the earthen pot, and scrape more off when you take them out; do this so often, till you have some quantity of this durty substance: cast quick-silver into this, and make a mixture; and while it is soft and tender, lay it on the Seal, and press it down, and let it remain in the open Air, for it will grow so hard, that you may almost seal with it; for it will become even like to a Metal. It may be also done another way: Take the filings of steel, and put them in an earthen Crucible at a

ſtrong fire; put ſuch things to it, as will haſten the melting of it: when it is melted, caſt it into ſome hollow place, pownd it in a braſs Mortar, for it will be eaſily done: do it ſo three or four times; then powder it, and mingle quick-ſilver with it, and let it boil in a glazed veſſel ſix hours, till it be well mingled; then preſs the ſeal upon it, and let it cool, and it will become exceeding hard. It is poſſible

To make a great Seal leſs,

If it ſhould happen that we want a leſſer ſeal, we muſt do thus: Take Iſinglaſs, and diſſolve it in water; anoynt the figure with oyl, that it may not ſtick to the glew; compaſs the ſeal about with wax, that the matter run not about; put the Iſinglaſs to the fire, and melt it, pour it upon the ſeal; after three hours, when it is cold, take it away, and let it dry, for the ſeal when it is dry, will be drawn leſs equally. If you will

Imitate the fo m of a writing,

do thus: Open the letter upon a looking-glaſs, that wants the foyl: upon the letter lay white paper, and a light under the glaſs; temper your ink as the writing is, and draw your lines upon the lines of the letters you ſee through. We may

Open letters, and ſhut them without ſuſpition.

We uſe to ſeal letters, putting paper upon them, which goes through the letter on one ſide, and wax is put on the other ſide, where it comes forth, and there it is ſealed. You ſhall open the letter thus: Break away that part of the paper, that is put upon the place, where it paſſeth through the letter, and the hole is, the letter opens preſently: read it, and ſhut it again, and put the paper torn off, in its proper place: firſt, anoynting the crack with gum-traganth, diſſolved in water; for the paper will be ſo glewed, that it will be ſtronger there then elſewhere; preſs it with a ſmall weight, till it grow dry; the fraud cannot be diſcovered, becauſe the glew is white, and is not known from the colour of the paper.

CHAP. XII.

How you may ſp ak at a great diſtance.

THere are many ways how we may ſpeak at a very great diſtance, with our friends that are abſent, or when they are in priſon, or ſhut up in Cities; and this is done with ſafety, and without any ſuſpition, as I ſhall ſhew. Two things are declared here, either to do it by open voice reduplicated, or elſe by a Trunk. We may

With open voyce ſhew ſome things to thoſe that are confederate with us.

It is wonderful, that as the Light, ſo the Voyce is reverberated with equal Angles. I ſhall ſhew how this may be done by a glaſs. It is almoſt grown common, how to ſpeak through right or circular walls. The voice paſſing from the mouth goes through the Air: if it goes about a wall that is uniform, it paſſeth uncorrupted; but if it be at liberty, it is beaten back by the wall it meets with in the way, and is heard, as we ſee in an Eccho. I through a circular building, that was very long and ſmooth, ſpake words to my friend, that heard them round the wall, and the words came entire to his ears; but one ſtanding in the middle heard not any noiſe, and yet I heard again what my friend anſwered to me. In the morning whenas I walked by the ſea ſhore, I heard above a mile, what my friends talked in a Boat: the ſea was very calm, and ſcarce moved, and the words came clearly to me, carried on the plain ſuperficies of the water. I hear that at Mantua, and other places, a great Gallery is built, wherein one ſpeaking in the corner, is heard by another that knows the buſineſs, ſtanding in another corner; but thoſe that ſtand in the middle, perceive nothing of it. But more exactly and clearly

To ſigniſie to friends all things by a Trunk,

Let

Let the pipe be of Earth (but lead is better) or of any matter well closed, that the voice may not get forth in the long passage; for whatever you speak at one end, the voice without any difference, as it came forth of the speakers mouth, comes so to the ears of him that hearkneth; and I doubt not but this may be done some miles off. The voyce not divided or scattered, goes whole a long way. I have tried it for above two hundred paces, when I had no other convenience, and the words were heard so clear, and open, as the speaker uttered them: Upon this it came into my mind, to intercept words spoken by the way, with leaden pipes, and to hold them so long as I pleased close in; that when I opened the hole, the words should break forth. I perceive that the sound goes by degrees, and that being carried through a pipe, it may be shut up in the middle; and if a very long Trunk should take away the convenience of it, that many winding pipes might shut it up in a close place. I read that *Albertus* made an Artificial head, that spake at a set time: I might hope to do the same by this invention; yet I never tried this farther then I have said: yet I have heard by my friends, that lovers have spoke a long time through a leaden pipe, from their Houses that stood far asunder.

Chap. XIII.

By night we may make signs by fire, and with dust by day.

IT remains to shew whether we can make signs in the night by fire, and in the day by dust, to declare our business. That may fall out two ways: For by fire of a sudden, we shew to our confederate friends, or when we please, by certain numbers of Torches, we represent letters fit to demonstrate what our purpose is, that those that are far off, seeing and observing the motions may perceive our intent. The first way, we read that *Medea* promised to the Argonauts, that if she killed *Pelias*, she would signifie so much unto them by night with fire from a watch-Tower, and by day with smoke. When therefore the business was effected, as she would have it, she counterfeited, that she must pay her vows to the Moon, by making a fire, by lighting Torches in the open Air, from the top of the place, as she had promised; and when the Argonauts understood it this way, they invaded the Kings palace, and killing the guard, they made her to enjoy her wishes. We read also that *Maga*, having possession of Paretonium, agreed with the watch, that at night in the evening, and again in the morning betimes, they should set up the light that was for confederacy; and by that means signs were made, that the messenger came as far as Clius. Also to friends that live out of the City, by fire we may signifie our revenew, and the quality of provision. It is apparent, that *Annibal*, as *Polybius* writes, when the people of Agrigentum were besieged by the Romans, by many and frequent fires by night, did shew forth the intolerable famine of his Army, and for that cause many of his Souldiers, for want of victuals, fell off to the enemy. Also the Grecians compacted with Sinon, that by night, when the Trojans were asleep, those that came to Troy should have a token, when he should open the Trojan Horse, to let forth the Souldiers that were within. Whence *Virgil*,

When the Kings fleet lift up the flames, just then
Did Sinon let forth all the Grecian men.

Also by Torches letters may be signified, as we find it in the Manuscript of *Polybius*. Tops of buildings or Towers, are very fit to set up the Torches on. Let the letters be divided into two or three parts, if there may be eleven, or seven parts of each. If they be seven, the first letters are shew'd by single Torches, the second by double ones, the third by three Torches. The number may be also divided into four parts: but in representing them, we must observe the variety of motion. For one Torch once lifted up, shall signifie A, the same lifted up twice B, thrice C; so seven times: the last of the first order G, after that two once H, so many twice I, thrice signifies L, and so of the rest of the same order. Then Q by the third order, once,

R by the same, twice, and thrice as many of the same, signifies S, and so it holds for four. Thus a woman from a watch-Tower, with three lights shewed five times, then with double ones twice, then with treble lights twice, then again with one at once, and with the same four times, then five times with three lights, then thrice, and with as many four times, shall signifie, *vir adest*, the man is come. Also the lights may be of divers colours, if they would shew that friends are neer. Also by smoke, we may shew that our enemies are neer, or some other thing. Hence it was, that by the policy of *Amilcar*, the men of Agrigentum, being drawn off far from the City, amongst their enemies that they pursued, unto an ambuscado, where the enemies lay hid, and a by wood set on fire, suffered a great overthrow: for when they thought they were called back by their friends, by reason of a smoke they supposed to come from the walls; when they turned their course to go to the City, *Amilcar* commanding, the Carthaginians followed them, who fled before, and so slew them.

THE

THE SEVENTEENTH BOOK OF Natural Magick:

Wherein are propounded Burning-glasses, and the wonderful sights to be seen by them.

THE PROEME.

Now I am come to Mathematical Sciences, and this place requires that I shew some experiments concerning Catoptrick glasses. For these shine amongst Geometrical instruments, for Ingenuity, Wonder, and Profit: For what could be invented more ingeniously, then that certain experiments should follow the imaginary conceits of the mind, and the truth of Mathematical Demonstrations should be made good by Ocular experiments? what could seem more wonderful, then that by reciprocal strokes of reflexion, Images should appear outwardly, hanging in the air, and yet neither the visible Object nor the Glass seen? that they may seem not to be the repercussion of the Glasses, but Spirits of vain Phantasms? to see burning Glasses, not to burn alone where the beams unite, but at a great distance to cast forth terrible fires, and flames, that are most profitable in warlike expeditions, as in many other things. We read that Archimedes *at Syracuse with burning Glasses defeated the forces of the Romans: and that King* Ptolomey *built a Tower in Pharos, where he set a Glass, that he could for six hundred miles, see by it the enemies Ships, that invaded his Country, and plundered it. I shall adde also those Spectacles, whereby poor blinde people can at great distance, perfectly see all things. And though venerable Antiquity seem to have invented many and great things, yet I shall set down greater, more Noble, and more Famous things, and that will not a little help to the Optick Science, that more sublime wits may increase it infinitely. Lastly, I shall shew how to make Crystal and Metal Glasses, and how to polish them.*

CHAP. I.

Divers representations made by plain Glasses.

I Shall begin with plain Glasses, for they are more simple, and the speculations thereof, are not so laborious, though the apparitions of them be almost common, yet they will be useful for what follows: and we shall add some secret apparitions unto them. The variety of the Images that appear, proceed either from the matter or form of the Glass. Crystal must be clear, transparent, and exactly made plain on both sides: and if one or both of these be wanting, they will represent divers and deformed apparitions to our sight. I shall therefore begin from the matter, and shew

How apparitions may seem to him that looks upon them, to be pale, yellow, or of divers colours.

When the Glass is melted with heat in the furnace, with any little colour it will be tainted; if you cast in yellow, the face of him that looks into it, will seem to have the yellow Jaundies; if black, he will appear wan and deformed; if you add much of it, like to a blackmoore; if red, like a drunkard or furious fellow; and so will it re-

present Images of any colour. How to mingle the colours, I taught when I spake of Jewels. I have oft made sport with the most fair women, with these Glasses; when they looked, and saw not themselves as they were: but there are many varieties arise from the form.

That the face of him that looks on the Glass may seem to be divided in the middle,

Let the superficies of the looking-glasse that you look on, be plain, and exactly polished by rule; but the backside must have a blunt angle in the middle, that the highest part of it may be in the middle; in the outward parts it must be sharp and pressed down; then lay on the foil: wherefore the Image that falls on your sight, where the lines meet in the angle, will seem divided into two. If you will

That he that looks in the Glass, shall seem like an Ass, Dog, or Sow;

By variation of the place, the Angles, and the representation of the Form beheld, will seem various. If that part of the Glass, that is set against your mouth, shall stick forth before like a wreathed band or a Bois-buckler, your mouth will appear to come forth like an Asses or Sows snout; but if it swell forth against your eyes, your eyes will seem to be put forth like shrimps eyes; if the Angle be stretched forth by the length of the Glass, your Forehead, Nose, and Chin, will seem to be sharp, as the mouth of a Dog.

That the whole face may seem various and deformed.

Let a plain Glass not be exactly plain and even: which that it may be done, when the Glass is once made plain, put it into the furnace again, and let it be turned by the skilful hand of an Artist, till it lose its right position, then foil it. Then the Image on the hollow part of the Glass, will represent the opposite part hollow; so it will hold forth one lying along on his face, or crooked, and swelling outwardly and inwardly. Then if when the Glass is polished, one side be rubbed, the face will seem long and broad: wherefore it must be rubbed, and fashioned on all sides, that it may every way represent a perfect face. I shall shew you also

How to make a Glass to represent many Images.

That it may shew divers Images one after another, and of divers colours, make the solid body of the Looking-glass, or Glass that is half a finger thick, and let it be so plained, that upon one side, the thickness may not be touched, but on the other side, the lines of the two superficies may meet, as the sharp edge of a Knife. Make also another table of a Glass the same way: or else more; lay a foil of Tin upon the last, and place one of them upon the other, so that the thinner part of the one, may lye upon the thick part of the other: so will the face of one that looks into it, appear to be two, one behind the other, and the nethermost will always appear darkest. So if by the same Artifice, you fit three tables of Glass, the Image will appear to be three, and the farther he that looks, stands with his face from the Glass, the farther will those Images or faces stand asunder; but as you come very neer, they seem to joyn all in one: If you hold a Candle lighted against it, there will be many seen together, which comes by the mutual reciprocation of the sight and the Glasse; and if the polishers of Glasses be not neer-hand, we may make the same with common Looking-ing-glasses, putting one aptly above another, but let one be distant from the other by certain courses; then shut them in a frame, that the Art may not be discovered. Nor will I omit

How letters may be cast out and read, on a wall that is far distant;

which we shall do with the same plain Glass; and lovers that are far asunder, may so hold commerce one with another. On the superficies of a plain Glass, make Letters with black ink, or with wax, that they may be solid to hinder the light of the Glass, and shadow it; then hold the Glass against the Sun-beams, so that the beams reflecting on the Glass, may be cast upon the opposite wall of a Chamber, it is no doubt but the light and letters will be seen in the Chamber, the Suns light will be

clearest,

clearest, and the letters not so bright; so that they will be clearly discovered, as they are sent in.

Chap. II.

Other merry sports with plain Looking-glasses.

NOw I shall annex some other operations of a plain Glass, described by our Ancestors, that I may seem to leave out nothing: and I will so augment them, and bring them to a rule, that they may be easily made. I shall begin with this,

How by plain Looking-glasses, the head may appear to be downwards, and the heels upwards.

If any man by plain Glasses, desires to see his head downward, and his feet upward (though it is proper for Concave-Glasses to represent that) yet I will endeavour to do it by plain Glasses. Place two Glasses long-ways, that they may stick together, and cannot easily come asunder, or move here and there, and that they make a right Angle; when this is so done, according to coherence the long way, set this against your face, that in one, half the face, in the other the other half may be seen; then incline the Looking-glasse to the right or left hand, looking right into it, and your head will seem to be turned, for according to their latitude, they will cut the face into two, and the Image will appear so, as if the head were under, and the heels upwards; and if the Glass be large, the whole body will seem to be inverted. But this happens from the mutual and manifold reflection, for it flies from one to the other, that it seems to be turned. We may

Make a plain Glass that shall represent the Image manifold.

A Glass is made that will make many representations, that is, that many things may be seen at once; for by opening and shutting it, you shall see twenty fingers for one, and more. You shall make it thus: Raise two brass Looking-glasses, or of Crystal, at right Angles upon the same basis, and let them be in a proportion called sesquialtera, that is, one and half, or some other proportion, and let them be joyned together longways, that they may be shut and opened, like to a Book; and the Angles be divers, such as are made at Venice: For one face being objected, you shall see many in them both, and this by so much the straighter, as you put them together, and the Angles are less: but they will be diminished by opening them, and the Angles being more obtuse, you shall see the fewer: so shewing one figure, there will be more seen: and farther, the right parts will shew right, and the left to be the left, which is contrary to Looking-glasses; and this is done by mutual reflection and pulsation, whence ariseth the variety of Images interchangably. We may

Make a Glass of plain Glasses, wherein one Image coming, is seen going back in another.

Take two plain Glasses, the length whereof shall be double, or one and half to the latitude, and that for greater convenience: for the proportion is not material; but let them be of the same length, and equal, and laid on the top of a Pillar, inclining one to the other, and so joyn'd together; and let them be set upright upon some plain place perpendicularly, so the Glasses fastned, may be moved on the moveable side. It is no doubt but you shall see the Image to come in one, and go back in the other Glass; and the more this comes neer, the farther will the other go; and in one will it be seen coming, and in the other going. Also you may see

In plain Glasses those things that are done afar off, and in other places.

So may a man secretly see, and without suspition, what is done afar off, & in other places, which otherwise cannot be done: but you must be careful in setting your Glasses. Let there be a place appointed in a house or elsewhere, where you may see any thing, and set a Glass right over against your window, or hole, that may be toward your face, and let it be set straight up if need were, or fastned to the wall, moving it here and

and there, and inclining it till it reflect right against the place; which you shall attain by looking on it, and coming toward it: and if it be difficult, you cannot mistake, if you use a quadrant or some such instrument; and let it be set perpendicular upon a line, that cuts the Angle of reflection, and incidence of the lines, and you shall clearly see what is done in that place. So it will happen also in divers places. Hence it is, that if one Glass will not do it well, you may do the same by more Glasses; or if the visible Object be lost by too great a distance, or taken away by walls or mountains coming between; moreover, you shall fit another Glass just against the former, upon a right line, which may divide the right Angle, or else it will not be done, and you shall see the place you desire. For one Glass sending the Image to the other tenfold, and the Image being broken by many things, flies from the eye, and you shall see what you first light upon, until such time as the Image is brought to you by right lines, and the visible Object is not stopt by the windings of places or walls: and the placing of it is easie. So oft-times I use to convey Images of things. But if otherwise you desire to see any high place, or that stands upright, and your eye cannot discern it; fit two Looking-glasses together long-ways, as I said, and fasten one upon the top of a post or wall, that it may stand above it, and the Object may stand right against it; the other to a cord, that you may move it handsomely when you please, and that it may make with the first sometimes a blunt, sometimes a sharp Angle, as need requires, until the line of the thing seen, may be refracted by the middle of the second Glass to your sight, and the Angles of reflection and incidence be equal; and if you seek to see high things, raise it; if low things, pull it down, till it beat back upon your sight, then shall you behold it. If you hold one of them in your hand, and look upon that, it will be more easily done. I show you also

How to make a Glass that shall shew nothing but what you will.

Also a Glass is so framed, that when you look into it, you shall not see your own picture, but some other face, that is not seen any where round about. Fasten a plain Glass on a wall upon a plain, set upright perpendicularly, and bow the top of it to the known proportion of the Angle: right against it cut the wall, according as the proportion of some Picture or Image may require, and set it by it, according to a fit distance, and cover it, that the beholder may not see it (and the matter will be the more wonderful) nor can come at it: The Glass at a set place will beat back the Image, that there will be a mutual glance of the visible Object and the sight, by the Looking-glasses: there place your eye; you shall find that place, as I taught you before. Wherefore the spectator going thither, shall neither see his own face, nor any thing else besides: when he is opposed to it, and comes to the set place, he shall see the Image or the Picture, or some such thing, which he can behold nowhere else. You shall now know

How a Glass may be made of plain Glasses, whereby you may see an Image flying in the Air.

Nor is that Glass of less importance, or pleasure, that will represent men flying in the Air. If any man would do it, it is easily done thus: Fit two pieces of wood together like a square or gnomon of a Dial, and being well fastned, they may make an Angle as of a right angled triangle, or Isosceles. Fasten then at each foot one great Looking-glass, equally distant, right one against the other, and equidistant from the Angle: let one of them lye flat, and let the spectator place himself about the middle of it, being somewhat raised above the ground, that he may the more easily see the form of the heel going and coming: for presently you shall perceive, if you set your self in a right line, that cuts that Angle, and it be equidistant to the horizon. So the representing Glass will send that Image to the other, which the spectator looks into, and it will shake and move the hands and feet, as Birds do when they fly. So shall he see his own Image flying in the other, that it will always move, so he depart not from the place of reflection, for that would spoil it.

CHAP.

Chap. III.

A Looking-glass called a Theatrical Glass.

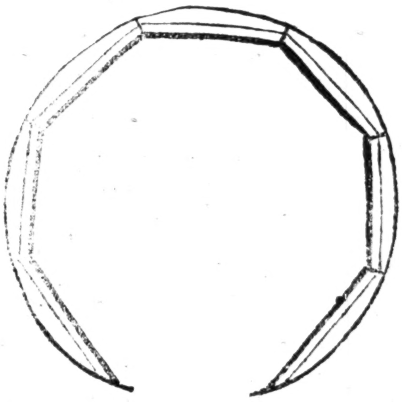
PRudent Antiquity found out a Looking-glass made of plain Glasses, wherein if one Object might be seen, it would represent more Images of the same thing; as we may perceive by some writings, that go in *Ptolomies* name. Lastly, I shall add to this what our age hath invented, that is far more admirable and pleasant. Wherefore

To make an Antient fashioned Looking-glass of plain Glasses, wherein more Pictures will be represented of the same thing.

The way is this; make a half circle on a plain Table, or place where you desire such a Glass to be set up; and divide this equally with points according to the number of the Images you would see. Make subtendent lines to them, and cut away the arches; then erect plain Looking-glasses, that may be of the same latitude, and of the same parallel lines, and the same longitude; glew them fast together, and fit them so, that they may not be pulled asunder, as they are joyned long-ways, and erected upon a plain superficies. Lastly, let the spectator place his eye in the centre of the circle, that he may have his sight uniform, in respect of them all; in each of them you shall see a several face, and so quite round, as we see it often when people dance round, or in a Theatre, and therefore it is called a Theatrical Glass: For from the centre all the perpendicular lines fall upon the superficies, and they are reflected into themselves; so they reflect the Images upon the eye, each of them drawing forth its own. This is the Antients way of making a Theatrical Glass; but it is childish: I will shew you one that is far more pleasant, and wonderful; for in the former, the Images were seen no more than the Glasses were in number; but in our Glass, by the manifold and reciprocal dartings of the Object and the Glass, you may see far more, and almost infinite Images. The way is this.

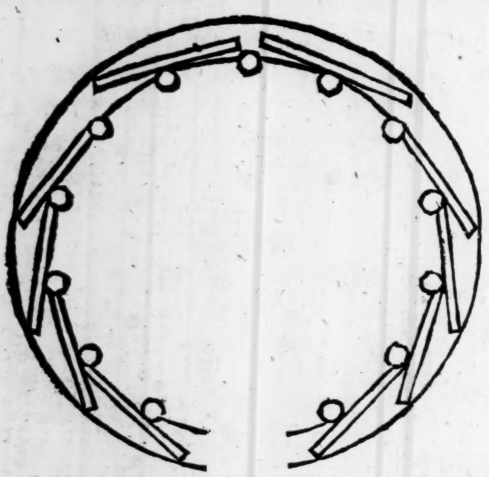
How to make an Amphitheatrical Glass.

Make a circle on a Table what largeness you desire, and divide it into unequal parts; and in the place where the Object or Face to be seen must be opposed, leave two void spaces: over against the parts, let a right line be made upon the lines that determine the parts, let Looking-glasses be raised perpendicularly; for the face that shall be against the Looking-glass, placed in the middle, will fly back to the beholder of it, and so rebounding to another, and from that to another, and by many reflections you shall see almost infinite faces, and the more the Glasses are, the more will be the faces: If you set a Candle against it, you shall see innumerable Candles. But if the Glasses you erect, shall be of those already described, from so many divers faces of Asses, Sows, Horses, Dogs; and of colours, yellow, Brown, red, the spectators shall see a far more wonderful and pleasant sight, for by reason of the manifold reflection, and diversity of the forms of the Glasses, and colours, an excellent mixture will arise.



But I will now make one that is far more wonderful and beautiful. For in that the beholder shall not see his own face, but a most wonderful, and pleasant, and orderly form of pillars, and the basis of them, and variety of Architecture. Make therefore a circle as you would have it for magnitude, but I hold the best to be where the diameter is two foot and a half: divide the circumference into equal parts; as for example, into fourteen; the points of the divisions shall be the places, where the pillars must be erected. Let the place where the spectator must look, contain two parts; and take one pillar away, so there will be thirteen

teen pillars: Let one pillar be right against the sight; then raise Looking-glasses upon the lines of space between, not exactly, but inclined: place then two Looking-glasses at opposition in a right line, but the rest about the beginning, where they joyn, and that for no other reason, but that the beholders face, being not rightly placed, may not be reflected, as I said before: for thus the Glasses will not represent faces, but pillars, and spaces between, and all ornaments. Hence by the reciprocal reflection of the Glasses, you shall see so many pillars, basis, and varieties, keeping the right order of Architecture, that nothing can be more pleasant, or more wonderful to behold. Let the perspective be the Dorick and Corinthian, adorned with Gold, Silver, Pearls, Jewels, Images, Pictures, and such like, that it may seem the more Magnificent: the form of it shall be thus. Let H. G. be the place for the beholder to look: the pillar against him shal be A, in the Glass A B, or A C, the face of the beholder shall not be seen, but A B is reflected into I H, and I H into B D, so by mutual reflections they are so multiplied, that they seem to go very far inwardly, so clearly and apparently, that no spectator that looks into it, unless he know it, but he will thrust his hands in to touch the orders. If you set a Candle in the middle, it will seem so to multiply by the Images rebounding, that you shall not see so many Stars in the skies, that you can never wonder enough at the Order, Symmetry, and the Prospect. I have raised and made this Amphitheatre divers ways, and to shew other orders, namely two ranks of pillars, so that the one stuck to the Glasses, the other stood alone in the middle, bound with the chief Arches, and with divers Ornaments, that it may seem to be a most beautiful Perspective or Architecture. Almost the same way is there made a little chest of many plain Glasses, covered round: this they call the Treasury: on the ground, arches and walls, were there Pearls, Jewels, Birds, and Monies hanging, and these were so multiplied by the reflections of the Glasses, that it represented a most rich Treasury indeed. Make therefore a Chest of wood, let the bottom be two foot long, and one and half broad; let it be open in the middle, that you may well thrust in your head; on the right and left hand, erect the side-boards a foot long, semicircular above, that it may be arched, but not exactly circular, namely, divided into five parts, each a hand-breadth. Cover this all about with Glasses; where the Glasses joyn, there put Pearls, Pretious-stones, specious Flowers, divers colour'd Birds: above the bottom set heaps of Gold, and Silver Meddals; from the Arches, let there hang Pearls, fleeces of Gold; for when the Coffer is moved gently, they will move also, and the Images will move in the Glasses, that it will be a pleasant sight.



CHAP. IV.

Divers operations of Concave-Glasses.

But the operations of Concave-glasses are far more curious and admirable, and will afford us more commodities. But you can do nothing perfectly with it, until you know first the point of inversion. Therefore that you may do it the better, and more easily

Know the point of Inversion of Images in a Concave-glass,

Do thus: Hold your Glass against the Sun, and where you see the beams unite, know that to be the point of Inversion. If you cannot well perceive that, breathe a thick vapour from your mouth upon it, and you shall apparently see where the coincidence is of the reflected beams; or set under it a vessel of boyling water. When you have found the point of Inversion, if you will

That

That all things shall seem greater.

Set your head below that point, and you shall behold a huge Face like a monstrous Bacchus, and your finger as great as your arm: So women pull hairs off their eye-brows, for they will shew as great as fingers. *Seneca* reports that *Hostius* made such Concave-Glasses, that they might make things shew greater: He was a great provoker to lust; so ordering his Glasses, that when he was abused by Sodomy, he might see all the motions of the Sodomite behind him, and delight himself with a false representation of his privy parts that shewed so great.

To kindle fire with a Concave-Glass.

This Glass is excellent above others, for this, that it unites the beams so strongly, that it will shew forth a light Pyramis of its beams, as you hold it to the Sun; and if you put any combustible matter in the centre of it, it will presently kindle and flame, that with a little stay will melt Lead or Tin, and will make Gold or Iron red hot: and I have heard by some, that Gold and Silver have been melted by it; more slowly in winter, but sooner in summer, because the medium is hotter; at noon rather than in the morning, or evening for the same reason.

To make an Image seem to hang in the Air, by a Concave-Glass.

This will be more wonderful with the segment of a circle, for it will appear farther from the Glass. If you be without the point of Inversion, you shall see your head downwards. That with fixed eyes, and not winking at all, you may behold the point, until it comes to your very sight: For where the Cathetus shall cut the line of reflection, there the species reflected will seem almost parted from the Glass: the neerer you are to the Centre, the greater will it be, that you will think to touch it with your hands: and if it be a great Glass, you cannot but wonder; for if any man run at the Glass with a drawn sword, another man will seem to meet him, and to run through his hand. If you shew a Candle, you will think a Candle is pendulous lighted in the Air. But if you will

That the Image of a Concave-Glass should go out far from the Centre;

when you have obtain'd the Image of the thing in its point, if you will have it farther distant from the Centre, and that the Picture of a thing shall be farther stretched forth, then you shall decline from the point a little toward the right or left hand, about the superficies of the Glass, and the Image will come forth the farther, and will come to your sight: There, namely where the Cathetus doth the farthest off that is possible touch the line of reflection, which few have observed: from which principle many strange wonders may be done. When you have this, you may easily

Reflect heat, cold, and the voice too, by a Concave-Glass.

If a man put a Candle in a place, where the visible Object is to be set, the Candle will come to your very eyes, and will offend them with its heat and light. But this is more wonderful, that as heat, so cold, should be reflected: if you put snow in that place, if it come to the eye, because it is sensible, it will presently feel the cold. But there is a greater wonder yet in it; for it will not onely reverberate heat and cold, but the voice too, and make an Eccho; for the voice is more rightly reflected by a polite and smooth superficies of the Glass, and more compleatly than by any wall. I prove this, because, if a man turn his face to the Glass, and his friend stand far behind his back, when he beholds his face, he shall decline his face from the point of Inversion; but on the right hand, about the superficies of the Glass, and his face will come forth far from the Glass, and will seem very great about the face of his friend: Whatsoever he shall speak with a low voyce against the Glass, he shall hear the same words and motions of his mouth, and all motion from the mouth of the reflected Image; and they that stand in the middle between them, shall perceive nothing at all. But he that would send his own Image to his friend, must observe till his head shall come to the Glass. It is profitable also

By a Concave-Glass to see in the night what is done afar off.

By this very Glass, we may in a tempestuous night, in the middle of the streets, cast the light a great way, even into other mens Chambers. Take the Glass in your hand, and set a Candle to the point of Inversion, for the parallel beams will be reflected to the place desired, and the place will be enlightned above sixty paces, and whatsoever falls between the parallels, will be clearly seen: the reason is, because the beams from the Centre to the circumference, are reflected parallel, when the parallels come to a point; and in the place thus illuminated, letters may be read, and all things done conveniently, that require great light. By the same Art we may

With a few small lights give light to a great Hall.

In Temples, Watches, and nightly Feasts, any man may thus with a few lights make a great light. At two or more places of the Chamber set Concave-glasses above, and let them be so ordered, that the place of concurrent parallels may be coincident in the place required; and in the point of Inversion of them, the light will be so multiplied, that it will be as light as noon-day. Lamps are best for this purpose, because the light varies not from the place. Candles are naught, because they alter the places of reflection. More commodiously then by a plain Glass, to signifie by a Concave-glass, secretly some notes to your friend: Thus, do as I said, make the marks upon your Glass superficies with wax or some dark substance, and setting it against the light, it will cast the light upon the walls of the Chamber, and there it will be dark where the letters are made: one that knows the craft, may easily read them. But this is more admirable for one that knows not the cause,

To read letters in a dark night.

A Concave-Glass is of great use for this, and it may be this may be good in time of necessity. Set your Concave-Glass against the Stars of the first magnitude, or against *Venus* or *Mercury*, or against a fire or light that is afar off; for the light reflected will meet in the point of burning, and reflects a most bright light, whereby you may easily read the smallest letters; for putting the point of reflection to every word, you shall see all clearly. But this is more necessary and profitable,

At any hour of the day with a Concave-Glass, to set a House or Fort on fire.

You may so burn the enemies Ships, Gates, Bridges, and the like, without danger or suspicion, at a set hour of the day, appointed the day before. Set your Glass against the Sun, and order it so, that the coincidence of the beams may fall upon the point: lay fuel there, and things that will take fire, as I shewed you: and if you would blow up Towers, make heaps of Gun-powder: at night set your Glass, and hide it, that it be not seen, for the next day the Sun will fall upon the same point, where you set fuel for the fire.

CHAP. V.

Of the mixt operations of the plain Concave-Glasses.

I Shall set down the mixt operations and benefits of both these Glasses, that what one cannot do alone, it may do by the help of another. If we would

Kindle fire afar off with a plain and a Concave Glass.

It falls out sometimes that one shut up in prison needs fire, and the Sun beams shine not in: or else I will shew how we may kindle Gun-powder without fire, or make mines and fill them with Gun powder, to blow up Castles or Rocks afar off without danger, setting them on fire by a plain Glass. A plain Glass as it receives the parallel beams of the Sun, it so reflects them, and therefore will cast the beams that are equidistant, a great way: but if a Concave-Glass receive them, it so unites them, that it sets things on fire. Wherefore, first proving where the Concave-Glass must be placed

placed, that it may fire the fuel cast in: the next day, at the hour appointed, let the plain Glass cast in the beams upon the Concave-glass, that will unite them: so without danger, or any suspicion of the enemy, we may kindle fire for our use. Nor is it useless,

That by a plain and Concave-Glass the smallest letters shall appear very great,

when letters are so small that they can onely be seen: For I have seen St. *Johns* Gospel, *In the beginning*, &c. writ so small, in so little place, that it was no bigger than a small pimple, or the sight in a Cocks eye. By this Artifice we may make them seem greater, and read them with ease. Put a Concave-glass, with the back of it to your brest; over against it in the point of burning, set the writing: behind set a plain Glass, that you may see it: Then in the plain Glass will the Images of the Characters be reflected, that are in the Concave-glass, which the Concave-Glass hath made greater, that you may read them without difficulty. You may

With a plain and Concave-Glass, make an Image be seen hanging altogether in the Air.

Do thus. I said that by help of a Concave-Glass, an Image may be sent forth: and this is seen by none but those that stand over against it; Set the Concave-Glass to your brest, without the Centre place a Poniard against it, and going farther off, set a plain Glass against it; and looking in that, you shall see the Image reflected from the Concave-glass, hanging in the Air, and that exactly. But if an ingenious man observe it, he may wonderfully see an Image hanging in the Air, that is received in a plain Glass, and sent far out as I shewed, without the help of a Concave-glass, and a visible spectacle, by the means of a plain Glass onely. You may also

By a plain Glass see your face turned the wrong way.

When you have set the Glass to your brest, as I said; set a plain Glass against it, and look upon it, it will cast it upon the Concave-glass, and that will beat it backwards on the plain Glass: so have you your purpose.

Chap. VI.

Other operations of a Concave-Glass.

Before I part from the operations of this Glass, I will tell you some use of it, that is very pleasant and admirable, whence great secrets of Nature may appear unto us. As,

To see all things in the dark, that are outwardly done in the Sun, with the colours of them.

You must shut all the Chamber windows, and it will do well to shut up all holes besides, lest any light breaking in should spoil all. Onely make one hole, that shall be a hands breadth and length; above this fit a little leaden or brass Table, and glew it, so thick as a paper; open a round hole in the middle of it, as great as your little finger: over against this, let there be white walls of paper, or white clothes, so shall you see all that is done without in the Sun, and those that walk in the streets, like to Antipodes, and what is right will be the left, and all things changed; and the farther they are off from the hole, the greater they will appear. If you bring your paper, or white Table neerer, they will shew less and clearer; but you must stay a while, for the Images will not be seen presently: because a strong similitude doth sometimes make a great sensation with the sence, and brings in such an affection, that not onely when the senses do act, are they in the organs, and do trouble them, but when they have done acting, they will stay long in them: which may easily be perceived. For when men walk in the Sun, if they come into the dark, that affection continues, that we can see nothing, or very scantly; because the affection made by the light, is still in our eyes; and when that is gone by degrees, we see clearly in dark places. Now will I declare what I ever concealed till now, and thought to conceal continually. If you put a small centicular Crystal glass to the hole, you shall presently see

all things clearer, the countenances of men walking, the colours, Garments, and all things as if you stood hard by; you shall see them with so much pleasure, that those that see it can never enough admire it. But if you will

See all things greater and clearer,

Over against it set the Glass, not that which dissipates by dispersing, but which congregates by uniting, both by coming to it, and going from it, till you know the true quantity of the Image, by a due appropinquation of the Centre; and so shall the beholder see more fitly Birds flying, the cloudy skies, or clear and blew, Mountains that are afar off; and in a small circle of paper (that is put over the hole) you shall see as it were an Epitomy of the whole world, and you will much rejoyce to see it: all things backwards, because they are neer to the Centre of the Glass, if you set them farther from the Centre, they will shew greater and upright, as they are, but not so clear. Hence you may,

If you cannot draw a Picture of a man or any things else, draw it by this means;

If you can but onely make the colours. This is an Art worth learning. Let the Sun beat upon the window, and there about the hole, let there be Pictures of men, that it may light upon them, but not upon the hole. Put a white paper against the hole, and you shall so long fit the men by the light, bringing them neer, or setting them further, until the Sun cast a perfect representation upon the Table against it: one that is skill'd in painting, must lay on colours where they are in the Table, and shall describe the manner of the countenance; so the Image being removed, the Picture will remain on the Table, and in the superficies it will be seen as an Image in a Glass. If you will

That all shall appear right,

This is a great secret: many have tryed it, but none could obtain it: For some setting Plain Glasses obliquely against the hole, by reverberation against the Table, they could see some things somewhat direct, but dark and not discernable. I oft-times by putting a white paper obliquely against the hole, and looking just against the hole, could see some things direct: but a Pyramis cut obliquely, did shew men without proportion, and very darkly. But thus you may obtain your desire: Put against the hole a convex Glass; from thence let the Image reflect on a Concave-glass: let the Concave-glass be distant from the Centre, for it will make those Images right, that it receives turned, by reason of the distance of the Centre. So upon the hole and the white paper, it will cast the Images of the Objects so clearly and plainly, that you will not wonder a little. But this I thought fit to let you understand, lest you fail in the work, that the Convex and Concave-glasses be proportionable circles: how you shall do this, will be here declared often. I shall shew also,

How in a Chamber you may see Hunting, Battles of Enemies, and other delusions.

Now for a conclusion I will add that, then which nothing can be more pleasant for great men, and Scholars, and ingenious persons to behold; That in a dark Chamber by white sheets objected, one may see as clearly and perspicuously, as if they were before his eyes, Huntings, Banquets, Armies of Enemies, Plays, and all things else that one desireth. Let there be over against that Chamber, where you desire to represent these things, some spacious Plain, where the Sun can freely shine: Upon that you shall set Trees in Order, also Woods, Mountains, Rivers, and Animals, that are really so, or made by Art, of Wood, or some other matter. You must frame little children in them, as we use to bring them in when Comedies are Acted: and you must counterfeit Stags, Bores, Rhinocerets, Elephants, Lions, and what other creatures you please: Then by degrees they must appear, as coming out of their dens, upon the Plain: The Hunter he must come with his hunting Pole, Nets, Arrows, and other necessaries, that may represent hunting: Let there be Horns, Cornets, Trumpets sounded: those that are in the Chamber shall see Trees, Animals, Hunters Faces, and all the rest so plainly, that they cannot tell whether they be true

or

or delusions: Swords drawn will glister in at the hole, that they will make people almost afraid. I have often shewed this kind of Spectacle to my friends, who much admired it, and took pleasure to see such a deceit; and I could hardly by natural reasons, and reasons from the Opticks remove them from their opinions, when I had discovered the secret. Hence it may appear to Philosophers, and those that study Opticks, how vision is made; and the question of intromission is taken away, that was antiently so discussed; nor can there be any better way to demonstrate both, than this. The Image is let in by the pupil, as by the hole of a window; and that part of the Sphere, that is set in the middle of the eye, stands in stead of a Crystal Table. I know ingenious people will be much delighted in this. It is declared more at large in our Opticks. From hence may one take his principles of declaring any thing to one that is confederate with him, that is secret, though the party be far off, shut up in prison. And no small Arts may be found out. You shall amend the distance by the magnitude of the Glass. You have sufficient. Others that undertook to teach this, have utter'd nothing but toyes, and I think none before knew it. If you desire to know

How you may see the Sun Eclipsed,

Now I have determined to shew how the Suns Eclipse may be seen. When the Sun is Eclipsed, shut your Chamber-windows, and put a paper before a hole, and you shall see the Sun: let it fall upon the paper opposite from a Concave-glass, and make a circle of the same magnitude: do so at the beginning, middle, and end of it. Thus may you without any hurt to your eyes, observe the points of the diameter of the Suns Eclipse.

Chap. VII.

How you may see in the dark, what is light without by reason of Torches.

VVE may demonstrate the same without the light of the Sun, not without wonder. Torches, or lights lighted on purpose in Chambers, we may see in another dark Chamber what is done, by fitting things as I said: but the light must not strike upon the hole, for it will hinder the operation; for it is a second light that carries the Images. I will not conceal at last a thing that is full of wonder and mirth, because I am faln upon this discourse,

That by night an Image may seem to hang in a Chamber.

In a tempestuous night the Image of any thing may be represented hanging in the middle of the Chamber, that will terrifie the beholders. Fit the Image before the hole, that you desire to make to seem hanging in the Air in another Chamber that is dark; let there be many Torches lighted round about. In the middle of the dark Chamber, place a white sheet, or some solid thing, that may receive the Image sent in: for the spectators that see not the sheet, will see the Image hanging in the middle of the Air, very clear, not without fear and terror, especially if the Artificer be ingenious.

Chap. VIII.

How without a Glass or representation of any other thing, an Image may seem to hang in the Air.

BEfore I part from this Image hanging in the Air, I will shew how you may make the Images of all things seem to hang in the Air, which will be a wonder of wonders; chiefly being done without the apparition of a Glass, or a visible Object. But first we will examine what the Antients writ of this matter. One *Vitellio* describes the business after his fashion, thus: Fasten the segment of a Cylinder in the middle of the house, set upon a Table, or Stool, that it may glance perpendicularly up-

upon the ground; then place your eye at some hole or chink that is somewhat distant from the Glass, and let it be fixed, that it may not move here and there: Over against the Glass break the wall, and make it like to a window: let it be Pyramidal in shape, and let the sharp point be within, and the basis without, as men use to do, when a Picture or any Image is placed for the eye to look upon; but let it be reflected on by the superficies of the Pyramidal Glass, that the Picture placed without, which your eye cannot see through the hole, may seem to hang pendulous in the Air; which will cause admiration to behold. A Pyramidal Convex-glass will do the same, if you fit it so that it may represent the same Image. It may be done also by a Sphærical Convex and Concave. But the matter promiseth more in the Frontispiece written upon it, then it will performe in the conclusion. Wherefore the Image will be seen without the Glass, but by the means of the Glass; so that the thing beheld in the Glass, will seem to be without it. But he is foully mistaken here, as in other places. He had said better, by a Cylinder of Crystal: For as a pillar it would make an irradiation outwardly, yet it would be worse seen than in the pillar, as I shall shew. But I shall discover what I purposed always to conceal;

That neither the Object nor Glass may be seen, yet the Image shall seem to hang alone, pendulous in the middle of the Chamber;

And walking about, you shall behold the Image every where. But is such a thing fit to be discovered to the people? shall I do such an unworthy Act? Ah! my pen falls out of my hand. Yet my desire to help posterity, overcomes; for perhaps from this gleaning as it were, greater and more admirable inventions may be produced. Let it be so: get not a Sphærical Cylinder, or Convex dissection of a Pyramidal Concave, the portion of which segment is not known; but let it be that which may descend upon his right Angle by a half Cylinder and a square, and is parted by an oblique Angle. Of two parts it must be received pendulous, and beneath in the half of its diameter it is conveyed from the middle. Let all the windows of the house be shut: stop all the chinks, that the light may not come in beneath. In that place where the spectacle is prepared, if the Sun or Moon beams fall in, the whole shew is spoiled. So place the beams of the Image that are beaten back, that the head of it may by repercussion fall right upon the earth. So will the visible Object that comes by repercussion, be reflected above and beneath; It will follow the fashion of the first Glass: let a Brass or Marble Table be so placed upon it, as we said; and lest the light falling from the window should light upon the plain Cylinder, and the crooked Glass, it must be stopped by a shutter of a hands-breath, that is three times as broad as the hole; for it will break forth every way: You shall cover the apparition, that the Image may be fitted very deep, that there may seem to be a pit: as the beams meet, let the spectator come, who cannot be in any great mistake. But cover your sight round, that the Glass offend not your eye. Then is the Image seen, and it shall not appear above the Table, where the falling of the Cathetus will cut the line of sight through the Centre of the Glass. I could open the matter no plainer, I have done what I could: I know he that can understand it, will rejoyce very much.

CHAP. IX.

Mixtures of Glasses, and divers apparitions of Images.

NOw will I try to make a Glass, wherein many diversities of Images shall appear: and though such a one be hard to make, yet it will recompence all by the diversity of Images, and the benefit of it. If then you would

Make a Glass that shall represent much diversity of Images.

Take a great or small circle, as you would have your Glass, and here and there cut off two parts of the circumference, one to the quantity of a Pentagon, the other of a Hexagon, as is clear in the Mathematicks: let the arch of the Pentagon be made hollow with some table, or Iron, that it may exactly receive it into it, and may seem

to

to be cut out of it; but the side of the Hexagon shal be contrary to this, for the quantity of that must be received by a Convex Table, that the arch of it may so stick forth: Then take a foil of Wax or Lead, of a convenient thickness, that exceeds the breadth of the arch of the Hexagon, and in length exceeds them both: Then crook this plate so, that it may exactly stand in the hollow of the wood, that there be no space or chink left between them; then let the Convex superficies that is preserved prominent, be applied inwardly, according to the breadth of it; that the form of the Concavity may not be against the Convexity, but that the same plate may receive both portions without impediment: Having thus made your model, make your Glass of steel, or of some other mixture, as I shall shew you; and when it is polished, it will shew you many diversites of Images. First, the right parts will shew right, and the left the left, whereas the nature of plain Glasses, is to shew the right side as left, and the left side as right: and if you go backwards, the Image will seem proportionable, and will come forward: if you come more towards the Convex superficies, the Image will shew ugly; and the neerer you come, the uglier will it shew, and be more like a horses head. If you incline the Glass, that will incline too; and by varying the Glass, and the situation of it, you shall perceive divers variations; sometimes the head down, and the heels up; and you shall see many other things that I think not needful to relate now: for being placed on a voluble set, that it may shew both parts before and behind, the spectator of himself may see all things. We may

Make a Glass out of all,

that in that alone all Images may be seen, that are seen in all: many mouths; sometimes greater, sometimes less, sometimes right, sometimes left, some neerer, some farther off, some equidistant. If a crooked be set in one place, in another a Concave, and a plain one in the middle, you shall see great diversity of Images. These are

The operations of a Convex Cylindrical Glass.

When your face is against it, the more deformed it appears in length, the more ugly it is for slenderness: if the length of it cut the face overthwart, it shews a low pressed down face like a Frogs, that you shall see nothing but the teeth: almost the same way, as you shall see it in a Sword, or any other long and polished steel: if you incline it forward, the forehead will appear very great, the chin small and slender like a horses. But contrary to these are

The operations of Cylindrical Concave-glasses.

If you look into the Concave, you shall see more Images of the same thing, imitating the said Glass. If you set your eye to the Centre, you shall see it all the breadth of the Glass; so your forehead, mouth, and the rest. If you turn such a Glass, that it may cut your face broad-ways, you shall presently see your head inverted, and the rest that I related in the Concave-glass.

The operations of a Pyramidal Glass turned,

are these: You shall see a sharp forehead, and a large chin. But the contrary way, a long forehead, with a very long nose. In a Concave you shall behold many faces, if according to the concavity you fit many portions of plain Glasses: for one looking into it, shall find them as many as there are Glasses, and all moving alike; and again, what Glass soever it be, if it be not plain, it shall shew always different from the Image.

CHAP. X.

Of the effects of a Lenticular Crystal.

MAny are the operations of a Lenticular Crystal, and I think not fit to pass them over in silence. For they are Concaves and Convexes. The same effects are in spectacles, which are most necessary for the use of mans life; whereof no man yet hath assign'd the effects, nor yet the reasons of them. But of these more at large in our Opticks. That no space may be empty, I shall touch some things here; I call Lenticulars, portions of circles compacted together, of Concaves and Convexes. I will first shew

How with a Convex Crystal Lenticular to kindle fire.

A Convex Lenticular kindleth fire most violently, and sooner, and more forcibly then a Concave-glass: I gave the reasons in my Opticks. For being held against the Sun, when the beams meet in the opposite part, it will kindle fire it is opposite to, melt Lead, and fire Metals. Moreover, if you will

By night give light afar off with a Lenticular Crystal,

Set a Candle a little behind the point of burning, so it will cast parallels a very great way to the opposite part, that you may see men pass the streets, and all things done in Chambers that are far from you. The same way as I said of a Concave-glass, we may

In a dark night read a letter by a Lenticular Crystal:

Put the letter behind the Glass, against the Stars or Candles a great way from you; where the beams meet, the words that are opposite will be clearly seen in a dark night, and the Chamber shut. But that which follows, will afford you a principle far better for your consideration: Namely,

By a Lenticular Crystal to see things that are far off, as if they were close by.

For setting your eye in the Centre of it behind the Lenticular, you are to look upon a thing afar off, and it will shew so neer, that you will think you touch it with your hand: You shall see the clothes colours, mens faces, and know your friends a great way from you. It is the same

To read an Epistle a great way off with a Lenticular Crystal.

For if you set your eye in the same place, and the Epistle be at a just distance, the letters will seem so great, that you may read them perfectly. But if you incline the Lenticular to behold the Epistle obliquely, the letters will seem so great, that you may read them above twenty paces off. And if you know how to multiply Lenticulars, I fear not but for a hundred paces you may see the smallest letters, that from one to another the Characters will be made greater: a weak sight must use spectacles fit for it. He that can fit this well, hath gain'd no small secret. We may

Do the same more perfectly with a Lenticular Crystal.

Concave Lenticulars will make one see most clearly things that are afar off; but Convexes, things neer hand; so you may use them as your sight requires. With a Concave you shall see small things afar off, very clearly; with a Convex, things neerer to be greater, but more obscurely: if you know how to fit them both together, you shall see both things afar off, and things neer hand, both greater and clearly. I have much helped some of my friends, who saw things afar off, weakly; and what was neer, confusedly, that they might see all things clearly. If you will, you may

By a Convex Lenticular Crystal see an Image hanging in the Air.

If you put the thing to be seen behind the Lenticular, that it may pass thorow the Centre,

tre, and set your eyes in the opposite part, you shall see the Image between the Glass and your eyes; and if you set a paper against it, you shall see it clearly: so that a lighted Candle will seem to burn upon the Paper. But

By a Concave Lenticular to describe compendiously how long and broad things are.

A Painter may do it with great commodity, and proportion: for by opposition to a Concave Lenticular, those things that are in a great Plain are contracted into a small compass by it; so that a Painter that beholds it, may with little labour and skill, draw them all proportionably and exactly: but to leave nothing concerning spectacles, I will shew

How a thing may appear multiplied.

Amongst sports that are carried about, a spectacle is of no small account: that Glass Instrument we put to our eyes, to see the better with. For of those things that delude the sight, there can be no better way invented, then by the medium; for that being changed, all things are changed. Wherefore prepare that of very solid thick Glass, that it may be the better worked by a wheel into proportions: wherefore fit it into many Forms and Angles, whereby we desire to multiply any thing: but in the middle of them, let the Angles be Pyramidal, and let it agree with the sight; that from divers Forms, Images may be retracted to the eyes, that they cannot discern the truth. Being now made of divers superficies, set them to your eyes; and if you look upon any mans face hard-by, you will think you see *Argus*, one that is all Eyes. If his nose, you shall see nothing but nose; so his hands, fingers, arms, that you shall see no man, but *Briareus* the Poet, faigned to have have an hundred hands. If you look upon Money, you shall see many for one, that you cannot touch it with your hands, but it will often deceive you; and it is better to pay with it then to receive. If you see a Galley afar off, you will think it is a fleet of war: If a Souldier walks, that it is an Army marching. And thus are things doubled, and men seem to have two faces, and two bodies, Thus are there divers ways to see, that one thing may seem to be another: and all these things will be evident to those that seek and enquire after them by tryal.

Chap. XI.

Of Spectacles whereby one may see very far, beyond imagination.

I Will not omit a thing admirable and exceeding useful; how bleare-ey'd people may see very far, and beyond that one would believe. I spake of *Plotomies* Glass, or rather spectacle, whereby for six hundred miles he saw the enemies ships coming; and I shall attempt to shew how that might be done, that we may know our friends some miles off, and read the smallest letters at a great distance, which can hardly be seen. A thing needful for mans use, and grounded upon the Opticks. And this may be done very easily; but the matter is not so to be published too easily; yet perspective will make it clear. Let the strongest sight be in the Centre of the Glass, where it shall be made, and all the Sun beams are most powerfully disperst, and unite not, but in the Centre of the foresaid Glass: in the middle of it, where diameters cross one the other, there is the concourse of them all. Thus is a Concave pillar-Glass made with sides equidistant: but let it be fitted by those Sections to the side with one oblique Angle: but obtuse Angled Triangles, or right Angled Triangles must be cut here and there with cross lines, drawn from the Centre, and so will the spectacle be made that is profitable for that use I speak of.

CHAP. XII.

How we may see in a Chamber things that are not.

I Thought this an Artifice not to be despised: for we may in any Chamber, if a man look in, see those things which were never there; and there is no man so witty that will think he is mistaken: Wherefore to describe the matter, Let there be a Chamber whereinto no other light comes, unless by the door or window where the spectator looks in: let the whole window or part of it be of Glass, as we use to do to keep out the cold; but let one part be polished, that there may be a Looking-glass on both sides, whence the spectator must look in; for the rest do nothing. Let Pictures be set over against this window, Marble statues, and such-like; for what is without will seem to be within, and what is behind the spectators back, he will think to be in the middle of the House, as far from the Glass inward, as they stand from it outwardly, and so clearly and certainly, that he will think he sees nothing but truth. But lest the skill should be known, let the part be made so where the Ornament is, that the spectator may not see it, as above his head, that a pavement may come between above his head: and if an ingenious man do this, it is impossible that he should suppose that he is deceived.

CHAP. XIII.

Of the operations of a Crystal Pillar.

NOr shall the operations of a Crystal Pillar go unspoken of, for in it there are some speculations not to be despised. First,

To kindle fire with a Crystal Pillar,

by opposing it to the Sun, it will kindle fire behind it about the circumference: oft-times left above the Chamber, when the Sun shined, it burnt the Blankets. They that will at set hours and places burn the enemies camps, if it be laid upon fuel for fire, it will certainly kindle it. We may also

With a Crystal Pillar, make an Image hang in the Aire.

It will shew the Image hanging in the Air, both before and behind. Let the Object be behind the Pillar, let the Pillar be between that and the eye, the Image will appear outwardly hanging in the Air, above the Pillar, parted every where from the Pillar, clearly and perspicuously; and if the visible Object be between the eye and the Pillar, the Image will appear behind the Pillar, as I said. If it be a very visible Object, as fire or a candle, the matter is seen more clearly without any difficulty: I gave the reasons in my Opticks. We may also

In a Crystal Pillar see many Rain-bows.

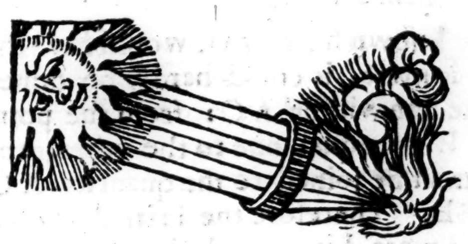
Make a solid Pillar in a Glass furnace, so great as a Walnut, and let it be made round onely by the fire, as the manner is, as Glass-makers use to do, that without any help of the wheel, the outward superficies may be most polite: where the Iron touched it, there leave a Pedestall. It is no matter for pure Glass, for impure is best: place this upon your eye, and a burning candle over against it; the light refracted by bladders will shew infinite Rain-bows, and all the light will seem Golden-colour'd, that nothing can be more pleasant to behold.

Chap. XIV.
Of Burning-Glasses.

I Proceed to Burning-Glasses, which being opposed against the Sun beams, will kindle fire upon matter laid under them; In these also are the greatest secrets of Nature known. I shall describe what is found out by *Euclide*, *Ptolomy*, and *Archimedes*; and I shall add our own inventions, that the Readers may judge how far new inventions exceed the old. Fire is kindled by reflection, retraction, and by a simple and a compound Glass. I shall begin from a simple reflection, and from

A Concave-Glass that shall kindle fire behind it :

which few have observed. Know, that a Concave-glass will burn from its middle point, unto the hexagonal-side above the Glass, as far as a fourth part of its diameter; from the hexagonal-side, as far as the tetragonal without the Glass, on the lower part of it: Wherefore cut off that part of the semicircle, which is situate from a pentagon as far as a tetragon, as it were the band of the circle; and this being polished, and opposed against the Sun, will cast fire far from it, behinde it. I will say no more, because I said more at large in my Opticks concerning this. So also we may



With a Concave Pillar or Pyramidal, kindle fire:

but very slowly, with delay onely, and in the Summer-Sun; it kindles in the whole line, and not in a point, but being extended by the point of accension of its circle. The same will fall out by a Pyramidal Concave.

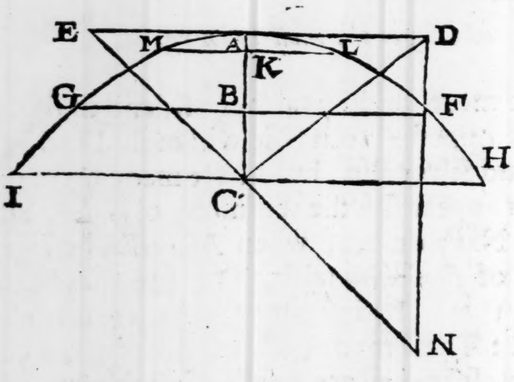
Chap. XV.
Of a Parabolical Section, that is of all Glasses the most burning.

THat is called a Parabolical Section, that more forcibly farther off, and in shorter time, will set matter on fire, that is opposite to it: it will melt Lead and Tin: My friends related to me, that Gold and Silver also; but I have made them red hot. By which invention of *Archimedes*, as appears by the testimony of *Galen*, and many more, We read that he set the Roman Navy on fire, when *Marcellus* besieged *Syracuse*, his Country. *Plutarch* in the life of *Pompilius* saith, The fire that burnt in *Diana's* Temple, was lighted by this Glass, that is, by instruments that are made of the side of right triangle, whose feet are equal: These made hollow, do from the circumference respect one Centre. When therefore they are held against the Sun, so that the beams kindled may be gathered from all parts, and be united in the Centre, and that they do sever the Air rarified, it soon sets on fire all fuel that is combustible opposed against it, by kindling first the lightest and driest parts; the beams being as so many fiery darts falling upon the Object. In a Concave spherical Glass the beams meeting together, kindle fire in a fourth part of the diameter under the Centre, which are directed within the side of a Hexagon from the superficies of the circle. But a Parabolical Section, is, wherein all the beams meet in one point from all the parts of its superficies. *Cardanus* teacheth how such a Glass should be made. If we would kindle fire at a mile distance, we must describe a circle, whose diameter must be two miles long; and of this we must take such a part, that the roundness of it may not lye hid, namely, a sixtieth part, to which we must add a dimetient, according to the altitude in one point, and upon the fixt diameter must we bring about part of the circle, which shall describe the portion of a Sphere; which when we have po-

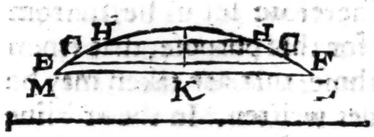
lished, if we hold it against the Sun, it will kindle a most violent fire a mile off 'Tis strange how many follies he betrays himself guilty of, in these words. First, he promiseth a Glass should burn a mile off; which I think is impossible to burn thirty foot off, for it would be of a wonderful vastness; for the superficies of the Cane is so plain,& to receive any crookedness, it can hardly be made so great.Moreover, to describe a circle,whose diameter should be two miles long,what compasses must we use, and what plate shall we make it on,or who shall draw it about?And if it be true,that *Archimedes* by a Parabolical Glass did burn ships from the wall,the distance could not be above ten paces,as appears by the words of the Authors themselves;for in the same place he raised ships , and threw them against the Rocks: and his engines were Iron bars, the greatest part whereof lay backward, and by reason of those iron crows, it is manifest it could be done no other ways. There are other fooleries,but I pass them for brevity sake, that I might not seem tedious: the cause of his error was, that he never had made any such Glasses; for had he tried it, he would have spoke otherwise. But I will now shew how

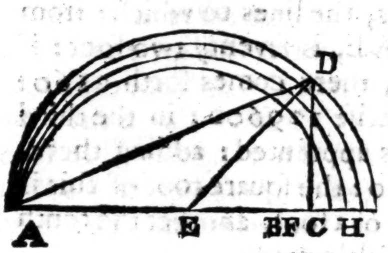
To make a Glass out of a Parabolical Section.

The way to describe it is this: Let the distance be known how far we would have the Glass to burn, namely, A B ten foot; for were it more, it could hardly be done: double the line A B, and make A B C, the whole line will be A C: from the point A, draw a right line D A, and let D A and A E be equal one to the other, and cut at right Angles by A C, but both of them must be joined to the quantity A C, as D C E, which in C make a right Angle, D C E. Therefore the Triangle D C E is a right angled Triangle, and equal sides: and were this turned about the Axis C D, until it come to its own place whence it parted,there would be made a right angled Cane, E D N C, whose Parabolical Section will be A B C: the right line D C will be the Axis of the Cane, and C E shall be the semidiameter of the basis of the Cane: Through the point C you must draw a line parallel to D E, and that is H I of the length of C E and C D; and by the point B draw another parallel to the said line E D, which is F B G;and let B G and B F be both of them equal to A C: so F G shall be the upright side, and H I the basis of the Parabolical Section: If therefore a line be drawn through the points H E A G I, that shall be a Parabolical Section, the Diagram whereof is this that follows.



But if you will burn any thing, you must not make your Parabolical Glass to the bigness of the whole line H F A G I, but onely take a part thereof, as if we would take the top part of it L A M, that the line L M may cut A C in K, or greater or lesser: if you will make one greater, cut off A K beneath it;for the bigger it is, the more quickly and vehemently wil it burn; if you will have it less,take it above A K. But thus you must do, that the crooked line L A M may be more exactly described, that you may not commit the least error. Wherefore on a plain Table I protract the line A B C, and let A B be double the distance, that we intend to burn any thing, that is, the length of the line A B C: from the point B, I raise a perpendicular line B D,the altitude whereof must be of the same semidiameter of the Section to be made,that is the line L M, the half whereof is L K; from thence describe a semicircle, whose beginning A must pass through the point D.But you shall find the Centre thus: Let the points A D be joyned by a line, and let the Angle B A D be made equal to A D E, and the line D E drawn forth, shall cut A C in F,that shall be the Centre: so draw the semicircle A D C. If therefore we shall cut the line B C into smaller parts , so much the lesser Parabolical line must be described. Divide it into four parts, and let the points of the divisions be H G F: then describe three circles, that shall be termined by A from the three points H G F: the first is A F, the second A G, the third A H: and they shall cut the



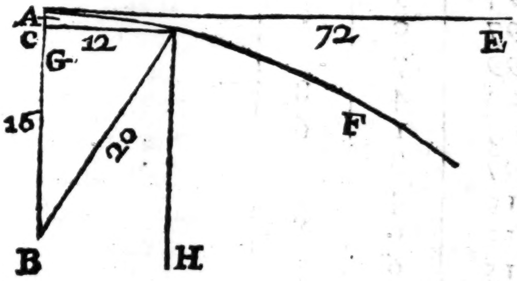


line B D; the first in F, the second in G, the third in H; thence I take my Section to be perfected L K M, and I cut the line K A into four parts, and thorow those points I draw parallel lines to L M. Let B H be the neerest to the top of the Parabolical Section, the second B G that follows next, and the third B F next to that, and after shall be L M. Thence by the lines L F G H A, draw a crooked line, and do the same on the other part so far as M, and that shall be the line sought for, to make the Parabolical Section, and from that must be made the Glass, as I shall shew.

Chap. XVI.

How a Parabolical Section may be described, that may burn obliquely, and at a very great distance.

I Have described a Parabolical Section, which might be made by rule and compass, because we may use it at a short distance; but in greater distance we must proceed by numbers: as for forty or for sixty foot, and not much more, lest the Glass should be made of an unusual magnitude. The foresaid Glass burns between it and the Sun; and if the Sun be not as you desire it, the operation is lost: so also by an oblique Glass, that is between the Sun and the combustible matter, or over against it. Whence according to the situation you may use them all, namely, wherein they answer your expectation; and especially when the Sun is in the Meridian, they burn with more vehemency. This I must tell you, that you may not be deceived; for when you erre, you commonly draw others into error with you. A Parabolical Glass made from the top, if the Section shall be from the top, if we would burn far, the Glass will be plain; and that it may have some crookedness, it will be wonderful great. And if the Section be about the basis, that will be worst of all; for from the least distance, it will be almost flat: wherefore that we may have it with some crookedness, we must take a line about the neck of the Section, not the head, nor the feet. Wherefore being to make a Glass of a Parabolical Section, about the neck of the Section, where the greatest crookedness of the Parabolical Section is made, and that may burn far from its superficies, to twenty foot distance; Let the line A B be the *sinus versus* eighteen foot long: from the point A, I raise a line to right Angles with A B, which shall be the line by which, the fourth part whereof is A B: cut A B in C, and let it be two foot, and C B sixteen foot: I multiply twice seventy two, and that makes one hundred forty and four: the square root of this is twelve; wherefore the line erected perpendicularly from the point C, unto the circumference of the Parabolical Section, will be D I of twelve foot, wherefore C I will be the line appointed: joyn I B, and the Radius that must burn, will be in the point B that was sought for: Wherefore the ray of the Sun, that is equidistant to the *sinus versus* H I, is reflected by I B in B; the Latitude whereof will be about twenty foot: for the line I C of twelve foot, multiplied into it self, will make one hundred forty and four; and C B is sixteen foot, which multiplied into it self, makes two hundred fifty and six; adde these together, and they make



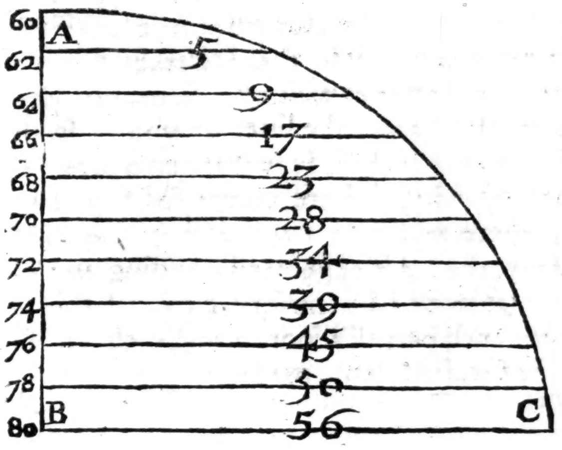
four hundred: the square root of it is twenty foot, thus. Wherefore I am resolved to take the part of the Glass, intercepted between the points I and F, and I seek two thirds of one foot, from C toward B, and I divide one foot into thirty parts, that the crookedness may be taken more precisely; and let C G be twenty parts of a foot,

a foot, from A to C sixty parts, because they are two foot: wherefore from A to G, where we shall make our Glass, will be eighty parts. Wherefore let us begin from A C sixty parts, to which I always add four cysers 0000. for this purpose, that when numbers come forth, whose roots cannot be extracted, those that are taken may be to the least loss: wherefore we shall make the Table under written. In the first line are the points of the *sinus versus*: in the second, the sqares, the lines to which; from the multiplication of the *sinus versus*, namely, the length A E, is seventy two foot: if we shall reduce these to parts, by multiplying by thirty, there comes forth 2160: multiply by the parts of the *sinus versus* A C, there will arise 129600: in the third line are roots of the foresaid number, namely, the lines appointed: adding therefore to 129600, four cysers, they make 1296000000: the square root of this is 36000 of which last cysers, one signifies the tenth part of a foot, another the tenth of a tenth part: thus, 360.0.0.0. so will be the foresaid Table made.

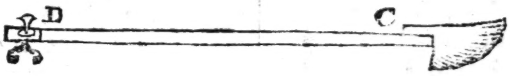
The points of sinus versus.	*Multiplication of sinus versus with the line to which.*	*The square root.*	*Tenth parts.*	*Tenths of tenth parts.*
60	129600	360	0	0
61	131760	362	9	8
62	133920	365	9	3
63	136080	368	8	9
64	138240	371	8	1
65	140400	374	7	6
66	142560	377	5	
67	144720	380	4	2
68	146880	383	2	4
69	149040	386	0	5

The points of sinus versus.	*Multiplication of sinus versus with the line to which.*	*The square root.*	*Decimal parts.*	*Decimals of decimals.*
70	151200	388	8	4
71	153360	391	6	1
72	155520	394	3	6
73	157680	397	0	8
74	159840	399	7	9
75	162600	402	4	8
76	164160	405	1	6
77	166320	407	8	2
78	168480	410	4	6
79	170640	413	0	8
80	172800	415	6	9

These



These things being done, I take the differences of the roots, of the greatest to the smallest, for they are from 160.0.0. to 415. 6. 9. Make choice of the measure of a foot, according to which distances we would make our Glass: let it be A B, which we divide into thirty parts; and take twenty parts, namely, two thirds: I adde a line to it at right Angles, namely B, and let it be B C, which I divide into fifty five parts. I divide one part into ten, and that one into ten parts more, and those are tens of tens. Let A be nul, that is a cyfer, and there place sixty; the second part sixty one: the line joyned to right Angles, will be two; the third part sixty two; the line joyned to it will be five: so the twentieth part will be eighty, and the line joyned to the Angle fifty six: to the extremities of these lines I fasten a pin, and I put a brass Cithern-wire upon them, and upon it I draw a line, and the Parabolical line is exactly described by it; for should we draw it without the help of this cord, it will be wavering, and not perfect. Then take a brass Table of convenient thickness, and draw the line now found upon it, filing away all that that shall be above the line C A. These things being done, take an iron rod of an exact length, namely, twelve foot, as the line D C, and at the end fasten a plate, which shall be for the circumvolution of the axis; at the other end fasten a spike, that it may be fastned somewhere, and be handsomely turned about. So being well fixed, we turn it about, by adding clay mingled with straw, that it may excellent well make a hollow place, like to the form of a Parabolical Section; which being dried, we must make another solid one, that it may contain the liquid Metal, as the maner is.

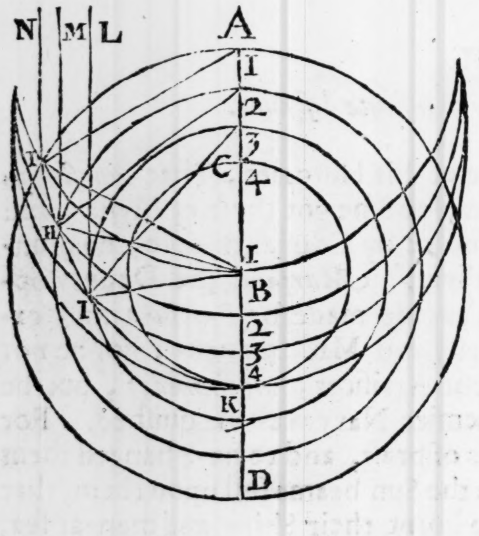


Chap. XVII.

A Parabolical Section that may burn to infinite distance.

Zonaras the Greek, writes in the third Tome of his Histories, That *Anastasius* moved sedition against *Vitalianus* a Thracian, and he got those of Mysia, and the Scythians to stand with him; and in the Country by Constantinople, he plundered the people, and besieged the City with a Fleet. *Marianus* the Deputy opposed him; and there being a fight at sea, by an engine made by *Proclus* a most excellent man, for he then was famous for Philosophy and Mathematicks; for he not onely knew all the secrets of the most eminent Artificer, *Archimedes*, but he found out some new inventions himself; the enemies Navy was vanquished. For *Proclus* is reported to have made Burning-Glasses of brass, and to have hanged them on the wall against the enemies Ships; and when the Sun beams fell upon them, that fire brake forth of them like to lightning, and so burnt their Ships and men at sea, as *Dion* reports that *Archimedes* did formerly to the Romans besieging *Syracuse*. But I will shew you a far more excellent way than the rest, and that no man as ever I knew writ of, and it exceeds the invention of all the Antients, and of our Age also; and I think the wit of man cannot go beyond it. This Glass doth not burn for ten, twenty, a hundred, or a thousand paces, or to a set distance, but at infinite distance: nor doth it kindle in the Cane where the rays meet, but the burning line proceeds from the Centre of the Glass of any Longitude, and it burns all it meets with in the way. Moreover, it burns behind, before, and of all sides. Yet I think it an unworthy act to divulge it to the ignorant common people: yet let it go into the light, that

that the immense goodness of our great God may be praised, and adored. Because a proportional Radius doth proceed from the greater Section, from the less is made the greater: to avoid this, make it of a Cylindrical Section, for it is the mean, and let it be set for the axis of the small and of the greater dissection, which may pass through the middle parallels: this held against the Sun, doth make refraction of the beams sent into it, very far, and perpendicularly from the Centre of a Cylindrical Section; and in this Art the reason cannot be found, that the beams uniting should part again: Wherefore it receives them directly, which it sends back again obliquely into beams far from the superficies of it. For the beams passing through the narrow hole of a window, are forthwith dilated; nor is their proportion kept, by being far removed, therefore it may reverberate and burn where the Cane seems clearest, which will be neer the Centre, nor is it far distant from the point where the rays meet; but neer the ray coming forth from that point, from the superficies of the Glass, called Parabolicall, which must remain firm in that place which I said before. Let experiment be made of its vertue, by threds passing from its Centre, or iron wire, or hair; and it is no matter whether it be Parabolical or Sphærical, or any Section of the same order: then let it be excellent well fitted upon the Centre of the said Section: If the rays go forth above, or a little beneath, it is no matter, if not much money, or much money be laid out to make it. The making of it depends meerly on the Artificers hand; the quantity is nothing, be it small or great. The Latitude of the hollow is not necessary, onely let it be sent forth from the middle, that the rays may meet excellent well in the Centre. Let the window be made open aslaunt, that it may receive a Parabolical Glass; and thus shall you have a Glass, if that be well done I spake of. *He that hath ears to hear, let him hear*; I have not spoken barbarously, nor could I speak more briefly, or more plainly. But if a small one do not answer a great one in proportion, know that you will operate nothing: let it be large about the basis, small at the top, equidistant to the first. Let it not be a steel Glass, because it cannot sustain the heat of the burning, and by burning it loseth its brightness. Let it be therefore of Glass a finger thick: Let the Tin foil be of purged Antimony, and Lead, such as they make in Germany: let the form be of clay: put the Glass upon it, and melt it in a Glass furnace, that it may take its form. This is a wonder, that that which causeth so much burning in the work, is cold, or at most but luke-warm. If you would have it burn before, of the Section which is about the basis, make a circle, in the middle point whereof fit the Artifice, that the ray returning, may come forth to the fore part. This I have said; and I have observed, that we may use this Artifice in great and wonderful things, and chiefly by inscribing letters in a full Moon. For whatsoever we have written by this Glass, as I said of a plain Glass, we may send letters of it to a very great distance: and because I said it sends forth to infinite distance, it is sent as far as the Moon, especially being helped by its light.

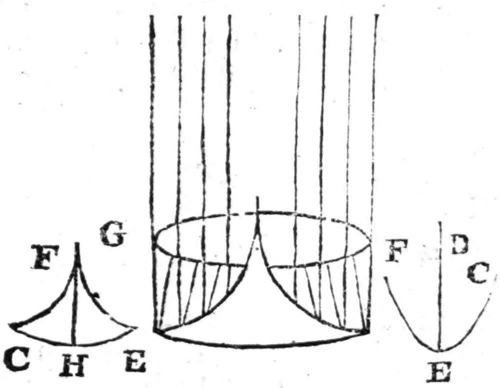


CHAP. XVIII.

To make a Burning-Glass of many Sphærical Sections.

V*itellio* describes a certain composition of a Burning-glass, made of divers Sphæral Sections: but what he writes he proves not, nor doth he understand what he says: whilst I was searching for that, I found this. Propound the distance of combustion, let it be C B, let it be doubled, C A shall be the semidiamiter of the Sphære, whose

whose Centre B must be extended to D, and the Diameter will be A D. Divide C A into four points, but the more the parts are, the more precise will be the description of the line, and set the numbers to the divisions: so setting the foot of the compass fast in I, and the moveable foot in B, make the semicircle E F, and mark it B I: and setting it in the 2. Centre at the same wideness, and the other moveable foot in the line B D, describe another semicircle and mark it 3. and so to the fourth and mark it 4. Then setting the foot firm in B, at the distance of B C, or B 4, make a circle, and the immoveable foot standing on the Centre B, upon the distance B 3, describe another: so there is the third B, and the fourth B A, as B I. Then from the point, A, draw a line, and another from the point B; and let them meet in a point where the circle I meets, with the semicircle 1. for let them be cut in G; then draw the second line from circle 2. and another from the same A the Centre, and let them meet, where the second circle cuts with the second semicircle in H; then from the third circle, and from B the Centre, and where they meet in, I, by the meeting of the semicircle: so from the fourth, where the fourth begins in K, and from K I H G draw a line, which shall be the Section to be described. The same may be done on the other part of the circle, the reason is this: The beam of the Sun L I falling upon the point I, of the Glass, is reflected to B, because B 3. and B I are equal from the same circle: therefore the Angle B 3 I, is equal to B I 3. But B 3 I is equal to 3 I L, because it is subalternate, for the ray of the Sun L I is equidistant to the diameter of the circle, wherefore the Angles L I 3 and 3 I B, are equal, therefore it is reflected upon B. The same is to be said of the beam M H and N G, and this Glass is contrary to a Sphæral Glass: From divers points of the circumference, the rays are reflected upon different parts of the diameter, and all the diameters are from the Centre: but in this the reflected beams unite, not in one point, and the diameter are various from the fourth of the diameter. But of this more largely in my Opticks. Lastly, I will not omit that the Cane doth kindle fire circularly, when that as far as this circle it kindles in a point. Divide the Parabolical line by *sinus versus*, and let them meet upon contrary parts. For example, let the Parabolical Section be C E F, the *sinus versus* D E: cut this circumference in E, and let C F meet together in the manner they stood before, that it may be E G F E, and about the axis G H turn it round, there will be made a round Cane, make it of Steel, or other Metal; and polish it, and it will kindle fire round about.



Chap. XIX.

Fire is kindled more forcible by refraction.

I Have spoken of Burning-glasses by reflection: Now I shall speak of those which burn by refraction; for these kindle fire more violently, I shall shew my reason in the Opticks. Wherefore

By a Cylindre of Crystal to kindle fire.

We may do it by setting it against the Sun, but very slowly and by leasure; for all the beams do not meet in one point, but in a line. The same way almost are we wont

To burn with a Pyramidal Crystal Glass.

But this burns about a line, yet both burn more strongly than a pillar Glass of a Pyramidal, in the place of this we may use a Vial full of water. But the most violent of them all, is with

A Crystal Sphære, or portion of it.

And if a Sphære be wanting, we may supply it with a Vial full of water, that is round and of Glass, set against the Sun: if you set behind it any combustible matter, that is friendly to the fire, so soon as the rays unite about the superficies, it forthwith kindleth fire, to the wonder of the Spectators: when they see fire raised from water, that is extreme cold, so will the portions of Sphæres, as spectacles, lenticulars, and such like, which we speak of already.

A Crystal parabolick-Glass will kindle fire most vehemently of all,

we shall see it, because the beams all meeting, it kindles more than a Glass. We may also, as I said of a Glass

By refraction, kindle fire afar off,

And almost to infinite distance, as is demonstrated by Obtick reasons; and the more by how much as refractions work more forcibly than reflections: and I shall perform this many ways, as I said before, not onely by reason, but by experience. *Almeon* said, That he made the same way parallel lines cut across. I have said also, that if they be opposed in place, Crystal Sphæres are so perfectly opposite by coition, as are Sphæral and Cylindrical portions. Nor do they cast forth fire so far, that it is hard to believe it, and more than imagination can comprehend. Behold, I shall shew you a more forcible way to kindle fire. It sends forth also unequal, and combust parallels. Let a uniform Section fall in, and it will carry forth oblique beams, you shall see the fire by a hidden and open beam, falling upon a right superficies, and it will come forcibly and uniformly into that place, where the beams unite most in a fit combustible matter: for if that combustible matter that is opposite, be not dry, it is in vain to set a Glass against it, either a Convex Cylindrical, or Concave Sphærical; for the matter will be found almost pierced through with strong fire, and if it be not truly opposite it will burn, whether it be small or great. But it is considerable, the portion of which it is. It will do also the same thing, if the thing be opposite, and be small or great, if need be.

CHAP. XX.

In a hollowed Glass how the Image may hang without.

BEfore I depart from a plain Glass, it is performed by the later Artists industry, that in the same Glass many faces may be seen, or likenesses of the same Image, without any hindrance to the first: for behind it they make the Glass hollow, and make a little Concave, whence a foil being laid on, as I shall shew, and fitted well, it will hold another forth without. Hence comes it to pass by this excellent invention, that a man looking in a Glass, may see the upright Image of some other thing, and wonders at it, for catching at it, he can catch nothing but Air. I remember that I have often seen it, and the matter is thus. A Glass being made of Crystal, they make a hollow place on the backside like an Image, as curiously as they can; then they foil it over, and set it in its place, now as deep as the hollow is with in, so much will it shew it self without the superficies; and you cannot satisfie your self, unless you touch it with your hands, whether it truly stick without the Glass or not. So Letters are truly read, that they will seem to be made in Silver upon the Crystal; nor is the eye so quick, but it may be deceived when it looks on. Nor will I omit the Artifice,

To see in a plain Glass that which appears no where.

I have often much delighted my friends, and made them admire with this Glass. Provide thirty or forty little Tables ready, of a foot and half long, and two fingers broad, and a third part of a finger thick; so artificially hewed, that the thickness may be upon the one side, and the thinness on the other side, like the edge of a knife.

Place

Place all these boards together, that the solid parts may stand altogether, as to make a perfect plain: Then paint your own Picture, or of some other thing upon it: yet by this artifice and great observation, that if the Image be neer the Glass, it must be drawn as it were afar off. If you would have it far distant, let the forehead be unmeasurably long, the nose somewhat longer, and the mouth, and the chin, likewise. The manner how to draw this Form exactly in Tables, I said in my Opticks. When the Image is now described, fasten the little boards upon a plain Table, that the head may be set downwards, and the chin upwards; and place the first Table after the second, and the second after the third, till they be all fastned. Hang the Table above a mans height, that no man may see into it, above the degrees of the Tables: and place a Glass over this, distant two foot from the Table, so long lifting it up, and putting it down till you see the perfect Image. Now when any man comes neer the Glass to see his own Image, he shall see the Image of some other thing that appears no where. In the breadth of the Tables you may draw some Picture, lest they should give some occasion to suspect.

Chap. XXI.

How Spectacles are made.

VVE see that Spectacles were very necessary for the operations already spoken of, or else lenticular Crystals, and without these no wonders can be done. It remains now to teach you how Spectacles and Looking-glasses are made, that every man may provide them for his use. In Germany there are made Glass-balls, whose diameter is a foot long, or there abouts. The Ball is marked with the Emrilstone round, and is so cut into many small circles, and they are brought to Venice. Here with a handle of Wood are they glewed on, by Colophonia melted: And if you will make Convex Spectacles, you must have a hollow irondish, that is a portion of a great Sphære, as you will have your Spectacles more or less Convex; and the dish must be perfectly polished. But if we seek for Concave Spectacles; let there be an Iron-ball, like to those we shoot with Gun-powder from the great Brass Canon: the superficies whereof is two, or three foot about: Upon the Dish, or Ball there is strewed white-sand, that comes from Vincentia, commonly called Saldame, and with water it is forcibly rubbed between our hands, and that so long until the superficies of that circle shall receive the Form of the Dish, namely, a Convex suprefcies, or else a Concave superficies upon the superficies of the Ball, that it may fit the superficies of it exactly. When that is done, heat the handle at a soft fire, and take off the Spectacle from it, and joyn the other side of it to the same handle with Colophonia, and work as you did before, that on both sides it may receive a Concave or Convex superficies: then rubbing it over again with the powder of Tripolis, that it may be exactly polished; when it is perfectly polished, you shall make it perspicuous thus. They fasten a woollen-cloth upon wood; and upon this they sprinkle water of Depart, and powder of Tripolis; and by rubbing it diligently, you shall see it take a perfect Glass. Thus are your great Lenticulars, and Spectacles made at Venice.

Chap. XXII.

How upon plain Concave and Convex Glasses, the foils are laid on and they are banded.

NOw it remains that I speak of some few things, not to be overpassed of the banding of Convex Glasses, and of foiling plain Glasses, and Convex Glasses, that so I may set down the perfect Science of Looking-glasses. First, for the terminating of Looking glasses, that are made of Crystal and Glass, then of other mixtures, and polishings, that a knowing Artificer may know, and know how to make them: For though amongst many things, that shew the Images of things, as water, some Jewels, and polished Metal do it; yet nothing doth so plainly represent Images,

as Lead foil'd upon Glaſs. Plain Looking-glaſſes are prepared of Cryſtal, and of Glaſs: thoſe of Cryſtal are poliſhed by wheels, and require another Artifice. But at Venice

How Glaſs Looking-glaſſes are made,

I have ſeen it. They take the melted Glaſs out with an Iron; with their blaſt they frame an empty Pillar; they open it on one ſide with their tongs, and whilſt it is red hot they lay it upon a plain plate of Iron, that is equally made; and they put it into the furnace again, to make it ſofter; and that it may get the perfect plainneſs of the iron plate, they leave it over the furnace to cool by degrees: When it is cool, they do thus

Poliſh plain Glaſſes.

They faſten it upon a plain Table with Gyp; underneath lyeth a moſt polite plain plate of iron; they caſt upon it the foreſaid ſand; they rub it with water by a ſtick, leaning thereon, until it be perfectly plain; they take it from the Table, and glew it on the other ſide, to poliſh them both: then they make them perſpicuous, as I ſaid they did. Now will I ſhew

To terminate plain Glaſs Looking-glaſſes.

Glaſs or Cryſtal Looking-glaſſes, when they are made plain aud equal, the Artiſt makes a foil of the ſame bigneſs of Tin, that is level and thin, as perfectly as he can. For if Cryſtal or Glaſs had no foil of Lead behind it, by its ſtrength and thickneſs it could never terminate our ſight, nor ſtay the Image Printed upon it, but it would let it ſlip away; for Glaſs is pure and tranſparent, and ſo would not contain it, by reaſon of its brightneſs; and ſo the Image would vaniſh in it, as light in the Sun. Wherefore upon this foil you ſhall wipe over with Quick-ſilver, by the means of a Hares foot, that it may appear all as Silver: and when you ſee it faſt on the ſuperficies, you ſhall put it upon a fair white paper, and ſo upon the Glaſs; but firſt made clean with a linen clout, and poliſhed: for if you handle it with your hands, the foil will not ſtick to it: with your left hand preſs down the Glaſs, and with the right take away the Paper, that the foil may cleave every where, and they bind faſt together; laying a weight upon it for ſome hours, and ſo let it ſtand and ſtir it not. Now I will ſhew

How a foil is put upon a Concave Glaſs.

But it is more laborious to lay a foil on a Concave-Glaſs: Prepare then a foil of the bigneſs of your Glaſs, that you ſhall lay upon the Convex ſuperficies; and holding it faſt with a finger of your left hand upon the Centre, with your right hand you ſhall fit the foil round about, and ſhall extend it on the ſaid ſuperficies, until it become of the ſame form with that convex ſuperficies, and ſtick every where even unto it. Then of moiſt Gyp ſhall you prepare a form of the Glaſs, namely, by pouring Gyp upon the Convex ſuperficies; and when the Gyp is dry, you have the form. Upon the form extend a foil of Tin, and let it agree perfectly with the form every where, becauſe the form and the foil are made after the ſame ſuperficies: ſtrew quick-ſilver upon the foil, and as I ſaid, make it ſtick by means of a Hares foot. The Artiſts call this *Avivare*: put paper upon it, and preſſing this upon the Glaſs, take away the paper; when you know it ſticks faſt, take away your hand, and lay on a weight, and after take it away, but with a careful balancing of your hand, leſt it take wind, and that the quick ſilver may all ſtick faſt every where. Now remains how

To terminate Convex-Glaſſes.

Make Glaſs Balls, but of pure Glaſs, and without bladders as much as you can, as the receivers for diſtillations; and from the hollow iron that it is blown in by, let this liquid moiſture be projected, namely, of Antimony and Lead; but the Antimony muſt be melted twice or thrice, and purged, and caſt Colophonia in. So ſtir the mixture in the hollow veſſel, and what remains caſt forth: and ſo in Germany they make Convex-Glaſſes.

Chap.

Chap. XXIII.
How Metal Looking-Glasses are made.

But Metal-Glasses are made another way. Wherefore if a Parabolical-Glass be to be made, draw a Parabolical line upon a brass or wooden Table; what is without it, must be filed away, that it may be equal, smooth, and polished: fasten it upon an Axis in the middle, and fit it with Instruments, that may be fitly turned about, let there be clay with straw under it, made up with dung, that the Table being turned about, it may receive a Concave form exactly; then let it dry, strew ashes upon it, and plaister clay above that, of a convenient thickness; let it dry by the fire, or if you will, by heat of the Sun, take it off, for it will easily part from the ashes: unite them together, that as much space may be between both forms, as you think fit, for the thickness of the Glass: when it is dry, cover it with this, leaving an open orifice on the top, and some breathing places, that the Air may breathe forth at it. Then make such a mixture; let them be put into a new pot that will endure the fire, and lute it well within, that it may hold the faster; let it dry well, and do this twice or thrice over: set it to the fire, and melt in it two pounds of Tartar, and as many of white Arsenick; when you see them fume, pour in fifty pounds of old brass, often used, and let it melt six or seven times, that it may be pure and cleansed; then adde twenty five pounds of English Pewter, and let them melt together: draw forth some little of the mixture with some Iron, and try it, whether it be brittle or hard; if it be brittle, put in more Brass; if too hard, put in Pewter: or else let it boil, that some part of the Pewter may evaporate: when it is come to the temper it should be, cast upon it two ounces of Borax, and let it alone till it dissolve into smoke; then cast it into your Mold, and let it cool: When it is cool, rub it with a Pumice-stone, then with powder of Emril. When you see that the superficies is perfectly polished and equal, rub it over with Tripolis. Lastly, make it bright and shining with burnt Tin; most adde a third part of Pewter to the Brass, that the mass may be the harder, and become more perspicuous.

THE

THE EIGHTEENTH BOOK OF Natural Magick:

Treating of things heavy and light.

The Proeme.

Many miracles worth relating and to be contemplated do offer themselves when I begin to describe heavy and light; and these things may be applied to very necessary and profitable uses, and if any man shall more deeply consider these things, he may invent many new things: that may be employed for very profitable ends. Next after these follow wind Instruments, that are almost from the same reason.

Chap. I.

That heavy things do not descend in the same degree of gravity, nor light things ascend.

Before I shall come to what I intend to demonstrate, I must premise somethings necessary, and set down some actions, without the knowledge whereof we can make no proof, nor demonstration. I call that heavy that descends to the Centre, and I say it is so much the heavior the sooner it descends, contrarily; that is light that ascends from the Centre, and the lighter that ascends soonest. I say that bodies yield one to the other, and do not penetrate one the other, as wine and water, and other liquors: Moreover, this action must be premised, that there is no body that is heavy in its own kind, as water in the element of water, or Air in Air. Also *vacuum* is so abhorred by Nature, that the world would sooner be pulled asunder than any vacuity can be admitted: and from this repugnancy of *vacuum* proceeds almost the cause of all wonderful things, which it may be I shall shew in a Book on this Subject. It is the force of *vacuum* that makes heavy things ascend, and light things descend contrary to the rule of Nature, so necessary it is that there can be nothing in the world without a Body. Therefore these things being premised, I shall descend to somethings. And first, a most heavy body shut up in a vessel, whose mouth is turned downwards into some liquor that is heavior, or of the same kind. I say it will not descend. Let the vessel turned with the mouth downwards, be A B filled with water, the mouth of it beneath must be put into a broad mouth'd vessel C D full of water, be it with the same liquor, or with another that is heavior. I say the water will not descend out of the vessel A B. For should the water contained in the vessel A B descend, it must needs be heavior than the water contain'd in the broad mouth'd vessel C D, which I said was of the same kind or heavior,

heavior, if then it should fall down it would be against the first action. The same would fall out if both vessels were filled with wine or water. For if the water contained in the vessel A B, should descend into the place of C D, there would remain vacuity in A being there is no place for the air to come in; and that were against the second axiom: wherefore by reason of *vacuum*, and because the body is no heavior, it falls not into the bowl beneath. But should one make a hole in the bottom of the vessel A, that the air might come in, no doubt the water would not fall down into the bazon: Also, if the vessel A B were filled with any light liquor, and the broad bazon with one that is heavior, they would not stir from their places. Let therefore the vessel A B be filled with wine, and the mouth of it turned downwards into a bazon full of water; I say both liquors will keep their places, and will not mingle; for should the wine descend, either *vacuum* must needs be in the body A, or a heavy body must ascend out of the vessel C D, which would be against the Nature of Gravity: and the second axiom, namely, that heavy should ascend, and light descend: wherefore they will not remove from their places. Hence comes that which is often done by great drinkers and gluttons, who pour by drops into a cup half full of water, so much wine as will fill the cup, they come so close together, that onely a line parts those liquors. And those that would sooner cool their wine, they dip a Vial full of wine into a vessel full of water, with the mouth turned downward, and hold it down under the water: for when the water toucheth the superficies of the wine, they cannot mingle, and the wine grows sooner cool, though it is necessary that the Vial should be lifted up to the superficies of the water, and suddenly turned about, poured forth and drank; then fill them again, and set in the bottle as before. From this advantage I complain of those, who first drink water, then pour in wine, for wine being the lighter, and water the heavior, they can hardly mingle: wherefore some drink at first the strongest wine, then mingled, and last of all, water. At great mens Tables they first bring wine in a Glass, then they pour in water, that the water by its weight may mingle with the wine, and get to the bottom, and tast equally. *Theophrastus* bids men first pour in wine, then water.

CHAP. II.

How we may by drinking, make sport with those that sit at Table with us.

WHen friends drink together, if we would by such a merry deceit delude the guests that are ignorant of the cause hereof, we may provoke them to drink with such a Cup; Let there be a great Cup made like a tunnel, let the mouth be broad above, and beneath narrow Pyramidally, and let it be joyn'd to a Glass-Ball, by a narrow mouth; First pour in water, till the whole Ball be filled; then put in wine by degrees, which by reason of the narrowness of the mouth will not mingle, and the water is heavy, and the wine lighter; He that drinks first, shall drink the wine; then give it your frind to drink, for he shall drink nothing but water. But if your friend shall challenge you to drink thus with him, and will have you drink first; fill the Ball of the Cup with wine, and pour water upon it, and stay awhile, and hold him in discourse; for the water will sink down by the narrow mouth, and the wine by degrees will ascend as much, and you shall see the wine come up through the middle of the water, and the water descend through the middle of the wine, and sink to the bottom; so they change their places: when you know that the water is gone down, and the wine come up, then drink, for you shall drink the wine, and your friend shall drink the water. Hence it is, that to great inconvenience of those that drink it, when we plunge our wine into a well in vessels of earth, or brass, ill stopt, to cool it, the water being the heavior comes in at the least chink, and forceth out the wine, so in a little time the vessel is full of water, and the wine is gone, that there is not the least taste of wine in it: wherefore stop the mouth very close.

CHAP.

CHAP. III.

How to part wine from water it is mingled with.

FRom these I shall easily shew two things, that a heavy body shut up in a Glass vessel, having the mouth of it put within a lighter liquid body, they will mutually give place, the lighter will ascend the heavior will descend, and that without any hindrance one of the other, which I shall demonstrate from the former principals. Let the Glass be turned downwards, and full of water, be, A B, the water is heavior than the wine: Let the mouth of it B, be put into the vessel C D, that is full of wine. These are bodies that will mutually yield one to the other as I shewed. I say the water will descend into the vessel C D, and the wine will ascend into the vessel A B, where the water was before. For the water, because it was contain'd in the vessel A B, it being heavy, presseth the wine in the vessel C D, that is lighter; and because there is no body between them, the water descends on one side into the vessel C D, and the wine ascends on the other side into the vessel A B. Now if the wine be red, that you may see the difference of their colours, you shall see the wine ascend through the middle of the water, as far as the bottom of the upper vessel that is put downward into the other, and the water to descend hastily to the bottom of the vessel C D, and one descends as low as the other riseth high; and if the liquors cannot be seen distinguished, yet one goes without any hindrance of the other, and without mingling, into its own place; and it will be a pleasant sight to behold the wine going up, and the water falling down; and when they rest, they will be so well parted, that not the least wine can remain with the water, nor water with the wine. Wherefore, if you put into a Hogshead full of wine, a long neck'd Glass full of water, in a short time the vessel turned downwards will be full of wine, and the water will go down into the Hogshhad. By this any man may easily conjecture

How to part water from wine,

because oft-times Country people and Vintagers use deceit, and bring wine mingled with water, to be sold to the Merchant: we may easily prevent their craft by this Art. Let there be underneath a vessel filled with wine, that is mixed with water, and we would separate the water from the wine: But first there must be a vessel that can receive all the wine, that is mingled in the other vessel; and if we know not the quantity, we must conjecture at it, how much it may be, of something less: then fill the said vessel with water. and set it with the mouth downwards on the other vessel, that is full of wine and water, mingled together; and let the upper part of the vessel turned downwards, touch the upper part of the lower liquour, that no Air may enter, for then the water will presently descend into the vessel underneath, and the lighter part of the mingled liquor will ascend, and the water will sink down, and if it be all wine, it will all ascend, no wine will stay with the water; if any thing stay behind, you must know that so much water was mingled with the wine, which may easily be known by the smell and taste, if you do it as it should be done. Then take a vessel that will hold more of the same liquor, and put it into a vessel underneath, till it takes it all in, whence by the proportion of the wine ascended, and of the water, any man may know easily how much water is mingled with the wine. But for convenience, let the Vial that shall hold the water be of a round belly, and the hole not very great, and let the vessel under, that contains the wine, have a narrow mouth, that the upper round mouth may the better joyn with the undermost, and no Air come in. But because it happeneth oft, that the upper Ball, when it hath drank in all the wine, the wine will not fill it, and we would part the water from the wine; take therefore the round Glass in your hand, and turn it about with the mouth upwards, then will the wine presently turn about and come uppermost, which may by a tongue laid in, be all call'd forth. Be careful to see when the wine is all drawn out, remove the tongue, and the water will remain pure.

Chap. IV.

How otherwise you may part water from wine.

I Can do this another way, not by levity and gravity, as I said, but by thinness and thickness; for water is the thinnest of all liquors, because it is simple, but wine being coloured, and colour comes from the mixture of the Elements, it is more corpulent: Wherefore to part wine from water, we must provide a matter that is full of holes, and make a vessel thereof, into which the wine poured with the water, may drean forth; for the water will drean forth through the pores of the matter, that is opened by a mingled and corpulent body. And though many kinds of wood be fit, yet Ivy is the best, because it is full of pores and chinks: wherefore if you make a vessel of Ivy wood that is green, and pour into it wine mingled with water, the water will in a short time drean out; Yet I see that all the Antients and modern Writers thought the contrary, yet both reason and experience are against them. For *Cato* saith, If you would know whether there be water put to your wine, make a vessel of Ivy, put your wine you think is mixed with water, into it: if there be any water, the wine will run forth, and the water stay behind, for an Ivy vessel will hold no wine. And *Pliny* from him: The Ivy is said to be wonderful for proof of wine. If a vessel be made of Ivy-wood, the wine will run forth, and the water will stay behind, if any were mingled with it: Whereupon both of them are to be noted for a twofold error, because they say it comes from the wonderful faculty of the Ivy, whereas every porous wood can do the same: Again, he saith that the wine will run forth, and the water stay behind, whereas it is the contrary. But *Democritus* thought what was truest and more probable, who used not an Ivy vessel, but one full of holes; saith he, they pour it into a new earthen pot not yet seasoned, and hang it up for two days, the pot, saith he, will leak, if any water be mingled with it. *Democritas* used another Art for the same purpose. Some stop the mouth of the vessel with a new Spunge dipt in Oyl, and incline it, and let it run forth; if there be water in it, onely the water will run forth, which experiment also he useth in Oyl: For the Spunge is full of holes, and open enough, and being dipt in Oyl, that hinders that the liquor cannot run forth so easily. *Africanus* adds another reason: Put liquid Alom into a vessel of wine, then stop the mouth with a Spunge dipt in Oyl, and incline it, and let it run forth; for nothing but the water will run out: For the Alom binds the liquors, that they drean forth very slowly.

Chap. V.

Another way to part a light body mingled with a heavy.

I Have another Art to seperate a light body from a heavy, or wine from water, or by another way. Make a linnen tongue, or of bombast, and dip it into the vessel, where wine is mingled with water, and let the tongue swim above without the liquor, and ascend above it, and so hang pendulous out of the vessel, for the lighter liquor will ascend by the tongue, and drop on the outside; but when the lighter ascends, it attracts the heavy also: wherefore, when you see the colour change, take the vessel away, for the water runs forth. It is evident that the wine being lighter, will always ascend to the top of the vessel, and run forth by the tongue; though all Vintners say the contrary, that the water will run forth by the tongue, and that the wine will stay within.

Chap. VI.
How light is mingled in heavy, or heavy in light.

WE can easily know whether any light matter is mingled with heavy, or any heavy matter with light: And I will expound the manner out of *Archimedes* his Book, concerning things that swim above water; the cause whereof is, that if Wood, stone, or any heavy Metal, be equal in weight to the same quantity of water, the utmost superficies of the body will be equal with the superficies of the water; if it weigh heavior, it will sink to the bottom; if it be lighter, the lighter it is then the water, so much of it will swim above the water. Since therefore this is true, and wine is heavior then water, one and the same thing will sink more in wine, than in water, and in thicker water the less. Wherefore vessels are more drown'd in Rivers, than in the Sea; for Sea-water is thicker and more heavy, by reason of its salt mingled with it; as also we have it in *Alexander*. If therefore you would know

Whether water be mingled with wine.

Put the wine you suspect to be mingled with water, into some vessel, and put an Apple or Pear into it; if the Apple sink, the wine is pure; but if it flote, the wine hath water mingled with it, because water is thicker than wine: Which *Democritus* saith is contrary and false. He saith it is necessary sometimes to commit the Care of the wine of new wine to Stewards and Servants, also the Merchant hath the like reason to try, whether his wine be pure. They use to cast an Apple into the vessel, but wilde Pears are the best; others cast in a Locust; others a Grashopper, and if they swim, it is pure wine, but if they sink, it is mingled with water. But if you seek to know

If new wine have any water mingled with it,

it will be the contrary for the contrary reason. For wine that is pure and sincere is thin, but new wine at first is thick, feculent, gross, clammy, because the feces are not yet sunk down, but in time it will grow clear and thin. Wherefore if you put Apples or Pears into new wine, and the new wine be most pure, the Apples will flote above it; but if there be water mingled with it, the Apples will sink to the bottom: for freeze-water is thinner than new wine, and lighter, it causeth the Apple to sink, which is excellent well described by *Sotion*, and very curiously. He saith, That we may know whether new wine be mingled with water, cast wilde Pears, that is green ones, into new wine, and if there be any water, they will sink to the bottom. For when you fill the vessel with new wine, if you cast in Services or Pears they will swim, the more water you put to it, the more will the Apple sink. But we shall adde this for an addition,

When new wine is mingled with water, to know which part is the best, the upper or lower part.

The Country people use after the pressing forth of the wine, when the clusters are pressed forth, to cast in a certain quaintity of water, and so they make drink for laborers in the Countrey. This new wine they divide, the Country man hath half, and the Landlord the other half: The question is which part is the best, the first, or last, that runs forth of the press. But if you well remember what I said before, the wine being the lightest will come uppermost, and the water being heaviest, will always sink to the bottom. Wherefore the first that comes forth is the wine, that which remains, and is pressed from the clusters, is watry. When water is cast on the clusters, it goes into the inmost parts of the Grapes, and draws forth the wine that is in them, and so they mingle; but being lighter, it chooseth the upper place, therefore the upper part is best, because it contains most wine: but if you turn the Cock beneath, the water will first run forth, and the wine last.

CHAP.

Chap. VII.

Other ways how to part wine from water.

THere are other ways to do it, as by distilling. For in distilling the lightest will ascend first, then the heaviest, when the fire is not too strong; and that is but reason: wherefore that the liquor may ascend, it must first be attenuated into thin vapours, and become lighter: therefore wine being thinner than water, if it be put in a still in Balneo, the lightest vapour of wine will ascend by degrees, and fall into the receiver: You shall observe the *Aqua vitæ* that distills into the vessel, and by the quantity of that, you may judge of the proportion of water mingled with the wine. Also note, that when the lightest part of the wine is ascended, the heavy feces remain, as water, or as part of the wine. Oft-times in our distillations, when *Aqua vitæ* was distilled in Balneo, by chance the vessel brake that contain'd the *Aqua vitæ*, and mingled with the water in the kettle: I put the mingled liquor into a Glass vessel, and putting a soft fire to it, first came forth the pure *Aqua vitæ*, simple without any water, the water stayed in the bottom, and kept not so much as the smell of the *Aqua vitæ*. By the veins running in the cup, I knew the water ascended. I will not omit (though it be for another reason) for pleasure and ingenuity to shew

The manner to part water from wine,

that by this means we may know how much water is mingled in the vessel. Take the quantity of the wine, and put it into a Glass Vial, and put the Vial into very cold water, that all that is in the Vial may freeze, as I shew'd: If the wine be sincere and pure, it will be the harder to freeze, and longer; if it have much water, it will freeze the sooner: When the wine is frozen, break the Vial upon a dish, the ice must melt by degrees; first the wine, because that is hotter: than the water will remain frozen; Part the wine from it, for it will be longer thawing: by proportion of this, you may know what part of water was put into the vessel.

Chap. VIII.

How the levity in the water and the air, is different, and what cunning may be wrought thereby.

NOw I will speak of heavy and light, otherwise than I spake before; namely, how it is in the air, and how in the water, and what speculation or profit may rise from thence. And first how we may know whether a Metal be pure, or mingled with other Metals, as Gold and Silver, as in Gilded cups, or else in moneys: where Silver or Gold is mingled with Brass, and what is their several weights: which speculation is useful not onely for Bankers, but also for Chymists, when they desire to try Metals in fixing of Silver, or other operations, which I will attempt to declare plainly. But first I will see whether the Antients speak any thing hereof. *Vitruvius* saith *Archimedes* did write of this: For when *Hiero* purposed to offer a Golden Crown to the Gods in the Temple, he put it to the Goldsmith by weight; he made the work curiously, and maintain'd it for good to the King, and by weight it seemed to be just: but afterwards it was said, that he had stoln part of the Gold, and made up the Crown with Silver to the full weight. *Hiero* enraged at this this, bad *Archimedes* to consider of it: He then by chance coming into a Bath, when he had descended into it, he observed that as much of his body as went into the Bath, so much water ran over the Bath: when he considered the reason of it, he leaped forth for joy, running home and crying *Eureka, Eureka*, that is, I have found it, I have found it. Then they say he made to lumps of equal weight with the Crown, one of Gold, the other of Silver; then he filled a large vessel to the very brims with water, and he put in the lump of Silver; the bigness of that thrust into the water, made the water run over: wherefore taking out the lump, what flowed over he put in

in again, having measured a sixt part, and he found what certain quantity of water answered to the quantity of the Silver: then he put in the lump of Gold into the full vessel, and taking that forth, by the same reason he found that not so much water ran forth, but so much less of the body of the Gold was less than the same weight in Silver. Then he filled the vessel with water, and put in the Crown, and he found that more water ran forth by reason of the Crown, than for the mass of Gold of the same weight, and from thence because more water run over by reason of the Crown, than for the Gold lump, he reasoned that there must be a mixture in the Crown. This was the Greeks invention, that is worthy of praise, but the operation is difficult; for in things of small quantity the theft cannot be discerned, nor can this reason appear so clear to the eye, where the obsolute fashion of the vessel was wanting. Now a way is invented how for all money, be it never so small, we can tell presently, and we want not many instruments, that we may cry, We have overfounded *Upereureka*, *Upereureka*, we have gone beyond *Archimedes* his *Eureka*. The way is this

To know any part of Silver mingled with Gold.

Take a perfect ballance, and put in one scale any Metal, in the other as much of the same Metal, but the purest of its kind; and when the scales hang even in the Air, put them into a vessel full of water, and let them down under water about half a foot: Then will it be a strange wonder, for the ballances that hang equal in the Air, will change their nature in the water, and will be unequal: for the impure Metal will be uppermost, and the pure will sink to the bottom. The reason is, because pure Gold compared with that kind, is heavior than all impure Gold, because pure Gold taketh less place; wherefore it will way heavior by the former reason. If then we would know how much Silver is in that Gold, put as much pure Gold in the other scale, as will make the ballances equal under the waters; when they are equal take them up, and the weight you added under water, will be the weight of the mixture. If you would know how much Gold is upon a vessel Gilded, put the Cup in one scale, and as much pure Silver in the other, that the scales may hang equal in the Air; then put them into the water, and the vessel will sink down; put into the other scale as much pure Gold, as will make them equal under water, draw them forth, and that is the weight of the Gilt of the plate: You shall do the same for Silver, Brass, Iron, white or black Lead. But would you know whether in Money, Brass be mingled with Silver, or Coin be adulterated with Copper; put the Money into one scale, and as much of the finest Silver into the other, ballance them equal; then put them under the water, the Money will go down; adde as much Brass as will make the scales equal, then take them forth, and it will be the weight of the mixture. Now will I set the weights of Metals, how much they weigh more in the waters, than in the Air, whereby without any other experiment we may know mixtures. An Iron-ball that weighed nighteen ounces in the Air, will weigh fifteen in the waters; whence it is that a Ball of the same magnitude must owe three ounces to the water; wherefore the proportion of Iron in the Air to the same in the waters, is as fifteen to nineteen. A Leaden Bullet of the same magnitude, weighs 31 ounces in the Air, in the water but 27: A Marble Bullet little less for bulk, weighs 7 in the Air, and 5 in the water: Copper weighs 16 in the Air, and 12 in the waters: Silver weighs in the Air 125, in the waters 113: Brass in the Air weighs 65 Karats, and one grain, in the waters 50 Karats and two grains: Crown Gold in the Air weighs 66 grains, in the waters 62: Gold called *Zechini* in the Air weighs 17 Karats, under water 16 Karats: Turkish Ducat Gold weighs in the Air 34, under waters 32: Common French Crown Gold weighs in the Air 67, under waters 60: Common Crown Gold of Hungary that is old, in the Air weighs 17, in the water 16: Crown Gold of Tartary weighs 16 in the Air, and 14 under water.

THE

THE

NINETEENTH BOOK

OF

Natural Magick:

Concerning VVind-Instruments.

The Proeme.

I Have spoken concerning light and heavy, now follow experiments by wind: for these seem to follow the reasons of Mathematicks, and of the Air, and water, and a Philosopher who seeks, to find things profitable, and admirable for mans use, must insist on these things, contemplate and search them out, in no thing doth the Majesty of Nature shine forth more. There are extant the famous Monuments of the most learned Heron *of Alexandria, concerning wind Instruments, I will adde some that are new, to give an occasion to search out greater matters.*

Chap. I.

Whether material Statues may speak by any Artificial way.

I Have read that in some Cities there was a Colassus of Brass, placed on a mighty high Pillar, which in violent tempests of wind from the nether parts, received a great blast, that was carried from the mouth to a Trumpet, that it blew strongly, or else sounded some other Instrument, which I believe to have been easie, because I have seen the like. Also, I read in many men of great Authority, that *Albertus Magnus* made a head that speak: Yet to speak the truth, I give little credit to that man, because all I made trial of from him, I found to be false, but what he took from other men. I will see whether an Image can be made that will speak. Some say that *Albertus* by Astrological elections of times, did perform this wonderful thing: but I wonder how learned men could be so guld; for they know the Stars have no such forces: Some think he did it by Magick Arts. And this I credit least of all, since there is no man that professeth himself to know those Arts but Impostors and Mountebanks, whilst they cheit ignorant men and simple women; nor do I think that the Godly man would profess ungodly Arts. But I suppose it may be done by wind. We see that the voice or a sound, will be conveighed entire through the Air, and that not in an instant, but by degrees in time. We see that Brass-guns, which by the force of Gun-powder, make a mighty noise, if they be a mile off, yet we see the flame much before we hear the sound: So hand-Guns make a report, that comes at a great distance to us, but some minutes of time are required for it, for that is the nature of sounds; Wherefore sounds go with time, and are entire without interruption, unless they break upon some place. The Eccho proves this, for it strikes whole against a wall, and so rebounds back, and is reflected as a beam of the Sun. Moreover, as I said in this work, words and voices go united together, and are carried very far entire, as they are spoken at first. These therefore being laid down for true grounds; if any man shall make leaden Pipes exceeding long, two or three hundred paces long (as I have tried) and shall speak in them some or many words, they will be carried true through those Pipes, and

and be heard at the other end, as they came from the speakers mouth: wherefore if that voice goes with time,& hold entire,if any man as the words are spoken shall stop the end of the Pipe,and he that is at the other end shall do the like,the voice may be intercepted in the middle, and be shut up as in a prison; and when the mouth is opened, the voice will come forth, as out of his mouth that spake it: but because such long Pipes cannot be made without trouble, they may be bent up and down like a Trumpet, that a long Pipe may be kept in a small place; and when the mouth is open, the words may be understood. I am now upon trial of it: if before my Book be Printed the business take effect, I will set it down; if not, if God please, I shall write of it elsewhere.

CHAP. II.

Of Instruments Musical made with water.

OLd Water-Instruments were of great esteem, but in our days the use is worn out: Yet we read that *Nero* took such delight in them, that when his Life and Empire were in danger, amongst the seditions of Souldiers and Commanders, and all was in imminent danger, he would not forsake the care of them, and pleasure he took in them. *Vitruvius* teacheth us how they were made, but so obscurely and mystically, that what he says is very little understood. I have tryed this by many and sundry ways, by mingling air with water, which placing in the end of a Pipe, or in my mouth, where the breath of the mouth strikes against the air; and though this made a pleasant noise, yet it kept no tune: For whilst the water bubbles, and trembles or warbles like a Nitingale, the voice is changed in divers tunes, one note is sweet and pleasant, two, squele and jar. But this way it will make a warbling sound, and keep the tune. Let there be made a Brass bottom'd Chest for the Organ, wherein the wind must be carried; let it be half full of water, let the wind be made by bellows, or some such way that must run through a neck under the waters; but the spirit that breaks forth of the middle of the water, is excluded into the empty place: when therefore by touching of the keys, the stops of the mouths of the Pipes are opened, the trembling wind coming into the Pipes,makes very pleasant trembling sounds, which I have tried and found to be true.

CHAP. III.

Of some Experiments by Wind-Instruments.

NOw will I proceed to the like Wind-Instruments, but of divers sorts that arise by reason of the air, and I shall shew how it is dilated, contracted, rarified by fire,condensed by cold. If you will

That a vessel turned downwards shall draw in the water,

do thus: Make a vessel with a very long neck; the longer it is, the greater wonder it will seem to be: Let it be of transparent Glass, that you may see the water running up; fill this with boiling water, and when it is very hot, or setting the bottom of it to the fire, that it may not presently wax cold, the mouth being turned downwards that it may touch the water, it will suck it all in. So such as search out the nature of things say, That by the Sun beams the water is drawn up, from the Concave places of the Earth to the tops of Mountains, whence fountains come forth. And no small Arts arise from hence, for Wind-Instruments, as *Heron* affirms. *Vitruvius* speaks the like concerning the original of Winds: but now it is come to be used for houses. For so may be made

A vessel to cast forth wind.

You may make Brass Bowles, or of some other matter: let them be hollow, and round, with a very small hole in the middle, that the water is put in at: if this be hard,

use the former experiment: when this is set at the fire it grows hot, and being it hath no other vent, it will blow strongly from thence, but the blast will be moist and thick, and of an ill savour. You may also make

A vessel that shall cast forth water,

There is carried about with us a Glass vessel, made Pyramidal, with a very narrow long mouth, with which it casts water very far off. That it may draw water; suck out the air with your mouth, as much as you can, and presently thrust the mouth into the water, for it will draw the water into it, do so until a third part of it be filled with water. When you will spout the water afar off, fill the vessel with air, blowing into it as hard as you can; presently take it from your mouth, and incline the mouth of the vessel, that the water may run to the mouth, and stop the air; and the air striving to break forth, will cast the water out a great way. But if you will without attraction of Air, make water fly far with it, heat the bottom of the vessel a little: for the air being rarefied seeks for more place, and striving to break forth, drives the water before it. Thus drunkards making a little hole in a vessel of wine, because the wine will not run out, the mouth being stopt, whereby the air might enter, they will blow hard into that hole; then as they leave off, the wine will come forth in as great quantity, as the air blowed in was. Now I will shew

How to make water ascend conveniently.

We can make water rise to the top of a Tower: Let there be a leaden Pipe that may come from the bottom to the top of the Tower, and go down again from the top to the bottom, as a Conduit; let one end stand in the water that we desire should rise, the other end that must be longer and hang down lower, must be fastned into a vessel of wood or earth that it may take no air at all: let it have a hole above the vessel, whereby the vessel may be filled with water, and then be stopt perfectly. Set a vessel on the top of the Tower, as capacious as that beneath, and the leaden pipe now spoke of, must be fastned at one end of the vessel, and go forth at the other end, and must be in the upper part of the vessel, and let the pipe be divided in the middle, within the vessel, and where the pipe enters, and where the pipe goes out, they must be joynted, that they take no air: when therefore we would have the water to ascend, fill the vessel beneath with water, and stop it close that it take no air, then opening the lower hole of the vessel, the water will run forth; for that part of water that runs out of the vessel, will cause as much to rise up at the other end by the other leaden pipe, and ascend above the Tower; the water drawn forth is filled up again, we may make our use of it, and the hole being stopt, the lower vessel may be filled again with water, and so doing we shall make the water to ascend always. We may also

By heat alone make the water rise,

Let there be a vessel above the Tower, either of Brass, Clay, or Wood, Brass is best: let there be a pipe in the middle of it, that may descend down to the water beneath, and be set under it, but fastned that it take no air: let the vessel above be made hot by the Sun, or fire, for the air that is contained in the vessel rarefies and breathes forth; whereupon we shall see the water rise into bubbles: when the Sun is gone, and the vessel grows cold, the air is condensed, and because the air included cannot fill up the vacuity, the water is called in, and ascends thither.

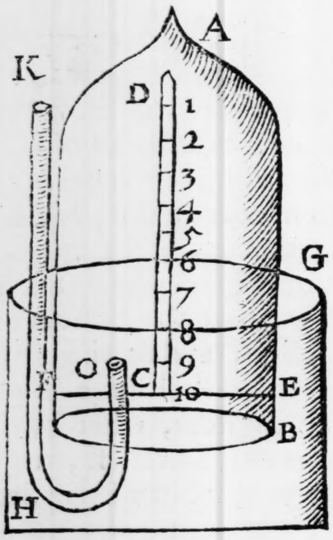
Chap. IV.

A discription of water Hour-glasses, wherein Wind or Water-Instruments for to shew the Hours are described.

THe Antients had Hour-Dials made by water, and Water-Dials were usual, and famous. *Heron* of Alexandria writ Books of Water-Dials, but they are lost. I have writ a Book of them, and that this part may not be deficient, I shall shew two that

that are made by contraries, one by blowing in the air, the other by sucking it out. This shall be the first.

A Water-Dial.



Take a vessel of Glass like a Urinal, it is described by the letters A B: On the top is A, where there is a very small hole, that the point of a needle can scarce enter it; at the bottom neer the mouth, let there be set a staff E F, that in the middle hath a firm Pillar going up to the very top of the vessel, let the Pillar be divided with the Hour-lines. Let there be also a wooden or earthen vessel G H, full of water: Upon the superficies of that water, place the Glass vessel A B, that by its weight will press toward the bottom, but the air included within the vessel, keeps it from going down: then open the little hole A, whereby the air going forth by degrees, the vessel will gradually descend also. Then make by another Dial, the marks on the staff C D, which descending will afterwards shew the Hour-marks. When therefore the vessel goes to the bottom of the wooden vessel, the Dial is done, and it is the last Hour: But when you would have your Dial go again, you must have a crooked empty pipe, O K, the upper mouth K must be stopt with the finger K; so K being stopt with the finger, that the air may not enter, sink it under the water, that it may come within the vessel A B: then put your mouth to K, and blow into it, for that will raise the vessel upward, and it will come to its former place and work again. I shall also describe for my minds sake

Another Water-Dial,

contrary to the former, namely, by sucking in the air. Let there be a Glass vessel, like to a Urinal as I said A B, and being empty set fast on it the vessel C D, that it cannot sink down: then fill it with water, as far as B: Let there be a hole neer the top, E, wherefore sucking the air by the hole E, the water comes into the vessel A B from the vessel C D, and will rise as high as F G: when therefore A B is full of water, stop the hole E, that no air enter, and the water will fall down again: In the top of the vessel A B, let there be another very small hole, that the air may come in by degrees, and so much as there comes in of air, so much water will go forth. On the superficies of the vessel, make Hour-lines that may shew the Hours marked, 1, 2, 3, *&c.* or if you will let the Still fastned to a Cork swim on the top of the water, and that will shew the Hours marked on the outside of the vessel.

CHAP. V.

A description of Vessels casting forth water by reason of Air.

NOw I will describe some Fountains, or Vessels, that by reason of air cast forth water: and though *Heron* ingeniously described some, yet will I set down some others that are artifically found out by me and other men. Here is described

A

A Fountain that casts forth water by compression of the Air,

Let there be a vessel of water-work close every where, A B, make a hole through the middle, and let a little pipe C D go up from the bottom of the water-work vessel D, so far from the bottom that the water may run forth. Upon the superficies of the Tympanum let there be C a very little hole with a cover to it, or let it have as the Greeks call it, Smerismation, to shut and open it handsomely, and in the upper surface of the Tympanum, bore the basis quite through with a little pipe, which enters into the hollow of the Tympanum, and having in the hole beneath a broad piece of leather or brass, that the air coming in may not go back: wherefore pour in water at E, that it may be three fingers above the bottom; then blow in air as vehemently as you can: when it is well pressed in, shut the mouth; then opening the mouth A, the water will fly up aloft, until the air be weak. I at Venice made a Tympanum with pipes of Glass, and when the water was cast forth very far, the Lord *Estens* much admired it, to see the water fly so high, and no visible thing to force it. I also made another place neer this Fountain, that let in light, and when the air was extenuated, so long as any light lasted the Fountain threw out water, which was a thing of much admiration, and yet but little labor. To confirm this, there is

An Artifice whereby a hand-Gun may shoot a bullet without fire,

For by the air onely pressed is the blast made. Let there be a hand Gun that is made hollow and very smooth, which may be done with a round instrument of lead, and with Emril-powder beaten, rubbing all the parts with it. Then you must have a round Instrument that is exactly plained on all parts, that may perfectly go in at the mouth of the wind Gun, and so fill it that no air may come forth: let it be all smeer'd with oyl, for the oyl by its grosness hinders any air to come forth. So this lead Bullet being put into the Guns mouth, and thrust down with great force and dexterity, then presently take away your hands (but you must first shut the little hole that is in the bottom of the hole) and the bullet and little stick will fall to the bottom, and by the violence of the air pressed together it will cast out the Bullet a great way, and the stick too, which is very strange. Also I will make

A Vessel, wherewith as you drink, the liquor shall be sprinkled about your face.

Make a vessel of Pewter, or Silver, like to a Urinal; then make another vessel in the fashion of a Tunnel, or a round Pyramis: let their mouths be equal, and joyn'd perfectly together, for they must be of the same breadth: let the spire of it be distant from the bottom of the Urinal a fingers breadth, and let it be open: then pour water into the vessel, and fill the Urinal unto the hole of the spire end, and fill the Tunnel to the top, and the rest of the Urinal will be empty, because the air hath no place to get forth: when therefore any man drinks, when the water is drank up as far as the hole of the spire end, by the air pressed within, is the water thrust violently forth, and flies in the face of him that drinks. Also there is a vessel that no man can drink out of it, but he who knows the art. Make an earthen or metal vessel, in form of a Bottle or Flagon, and make it full of holes from the neck to the middle of the belly: From the bottom let a pipe ascend by the handle of the vessel, and the handle being round about it, let it come above the brims of the vessel, empty: under the handle in a place not seen, make a little hole, that any man holding the vessel by the handle, may with his finger stop and unstop this hole when he please: under the brim of the vessel, where you set it to your mouth, let there be another secret hole. Then pour water into the vessel: if now any man put the bottle to his mouth, and raiseth it to drink, the water will run forth at the neck that is open, and at the belly; but he that knows the trick, taking the vessel by the handle, shuts the hole with his thumb, and not moving the vessel, he draws the air with his mouth, for the water follows the air, and so he drinks it all up; but if any man suck, and shut not the hole, the water will not follow.

CHAP. VI.

That we may use the Air in many Arts.

WE may use Air in many Artifices, I shall set down some, that I may give a hint to others to invent more. And chiefly

How wind may be made in a chamber, that guests may almost freeze,

Make a deep pit, and put in a sufficient quantity of river or running water; let the pit be close stopt, onely let a pipe convey it through the walls, that it may be brought into the chamber. Let the water be let down into the pit by a kind of Tunnel, lest the air should come forth at the place where it goes in: by the water is the air of the pit expelled, and comes by the pipe into the chamber, that not onely those that sleep there, but such as converse there are extream cold, and benummed. I will shew

How Air may serve for Bellows,

I saw this at Rome. Make a little cellar that's close on all sides, pour in by a Tunnel from above, a quantity of water; on the top of the wall let there be a little hole, at which the air may break forth with violence; for it will come so forcibly, that it will kindle a fire, and serve for bellows for Brass and Iron-melting furnaces; the Tunnel being so made, that when need is, it may be turned, and water may be put in.

THE

THE TWENTIETH BOOK OF Natural Magick:

The Chaos, wherein the Experiments are set down without any Classical Order.

The Proeme.

I Determined at the beginning of my Book to write Experiments, that are contain'd in all Natural Sciences, but by my business that called me off, my mind was hindred, so that I could not accomplish what I intended. Since therefore I could not do what I would, I must be willing to do what I can. Therefore I shut up in this Book, those Experiments that could be included in no Classes, which were so diverse and various, that they could not make up a Science, or a Book; and thereupon I have here heaped them altogether confusedly as what I had overpassed; and if God please, I will another time give you a more perfect Book. Now you must rest content with these.

Chap. I.

How Sea-water may be made potable.

It is no small commodity to mankinde, if Sea-water may be made potable. In long voyages, as to the Indies it is of great concernment: For whilst Sea men, by reason of tempests are forced to stay longer at Sea than they would, for want of water they fall into great danger of their lives. Galleys are forced all most every ten days to put in for fresh water, and therefore they cannot long wander in enemies countries, nor go far, for enemies stop their passages. Moreover, in sea Towns and Islands, when they want water, as in our days, in the Island Malta, and in the Syrses, Souldiers and Inhabitants endured much hardness, and Histories relate many such things. Hence I thought it necessary to search curiously, whether Sea-water might be made potable. But it is impossible to finde out any thing for this, how it may be done, unless we first finde out the cause of its saltness, and what our Ancestors have said concerning that matter; especially since *Aristotle* saith, That the salt may easily be taken from the Sea, because the sea is not salt of its own Nature, but by the Sun that heats the water, which draws out of it, cold and dry earthly exhalations to the top of it, and these being there burnt cause it to be salt, when the moist subtile parts are resolved into thin vapors. We therefore imitating Nature, by raising the thin parts by Chymical Instruments, may easily make it sweet. For so the Nature of the Sea, makes sweet waters for the Rivers. There are also veins of the Sea, in the deep parts of the earth, that are heated by the Sun, and the vapours are elevated to the tops of the heighest Mountains, where by the cold superficies they meet with, they congeal into drops; and dropping down by the vaulted roofs of Caves, they run forth in open streams. We first fill a hollow vessel like a great Ball, with Sea-water, it must have a long neck, and a cap upon it, that live coles being put under, the water may resolve into thin vapors,

pors, and fill all vacuities, being carryed aloft: this ill sented grossness, when it comes to touch the coldness of the head or cap, and meets with the Glass, gathers like dew about the skirts of it; and so running down the arches of the cap, it turns to water, and a pipe being opened that pertains to it, it runs forth largely, and the receiver stands to receive it as it drops: so will sweet water come from salt, and the salt tarryeth at the bottom of the vessel, and three pound of salt water, will give two pounds of fresh water; but if the cap of the limbeck be of Lead, it will afford more water, yet not so good. For *Galen* saith, That water that runs through pipes of Lead, if it be drank, will cause an excoriation of the intestines. But I found a way

How to get a greater quantity of fresh water, when we distil salt water.

Make a cap of earth, like to a Pyramis, all full of holes, that through the holes, Urinals of Earth or Glass may be brought in. Let their mouths stick forth, well luted that the vapor may not exhale; the cap after the fashion of the limbeck, must have its pipe at the bottom running round, and let it drop forth at the nose of it. Set this upon a brass Cauldron, that will hold much water; fill it with salt water, after that the Urinals; and putting on their caps, when fire is put under, both the Urinals will drop, and the cap that contains others, by its pipe will drop out water also: for the vapors rising from the Cauldron of hot water, will make the Urinals drop, and the cap will drop withal. But if at Sea the commodity of such a vessel cannot be had. We may

Distil salt water otherwise,

though but little. *Dioscorides* shews the old way of distillation; we may that way distil sea water in ships, which *Pliny* shews also. Fleeces of wool extended about the ship, are made wet by the vapors rising from the Sea, and sweet water is pressed out of them. But let us see, whiter

Salt water may be made fresh another way.

Aristotle saith it, and *Solomon* before him, That all Rivers came from the Sea, and return to the Sea; for by the secret passages under ground, the waters that are sent forth, leave their earthly and dry parts mixed with the earth, and they come forth pure and sweet. He saith, The cause why the salt water comes not forth, is, because it is ponderous, and settles, and therefore onely hot-waters of salt-waters, can run forth, for they have a lightness that oversways the weight of the salt; for what is hot, is lightest: Adde, that waters running through the earth are much strained, and therefore the heavior and thicker they are, the more do they continually sink down, and are left behind; and the lighter they are, the more pure do they come forth and are severed. For as Salt is heavy, so sweet water is light; and so it comes, that they are sweet waters that run forth. This is the very cause why salt-water, when it moves and is changed, is made the sweeter, for motion makes it lighter and purer. Let us see now if we can imitate Nature: Fill then great vessels with earth, and set them so one above another, that one may drean into another; and thus salt-water dreaning through many vessels, may leave the salt behinde. I tried it through ten vessels, and it remain'd still salt: My friend said, that he made it sweet through twenty vessels. Yet thus I thought to warn you of, that all earth is not fit for this use. *Solinus* saith, That sea-water strain'd through clay will grow sweet; and it is proved that the salt is taken away, if you strain it often through thin sand of a River. Earth that lies in covered places, and under roots, is naught, for that is commonly salt; as also where Cattle are stalled, which *Columella* saith is naught for Trees, for that it makes salt-water, what is strain'd from it. Black earth is naught, for it makes the waters sharp, but clay grounds make sweet waters. *Paxamus*, *Anaxagoras* said, That the saltness of the sea came from the Rivers, running through salt places, and communicating that quality to the sea. Some approve River-gravel for this use, and their reason is, because always sweet waters are found by the shores, and they say this happens, because they are strain'd through the sand, and so grow fresh coming from the salt-sea: for the sweet water that is found neer the sea, is not of the sea, but such water as comes from the tops of hills, through the secret channels of the earth,

earth, thither. For waters that drean forth sweet, are sweet though they lye even with the sea, and in plain places; as *Apuila*, where the waters drean not from the hills, they are salt. So on the shores of Africa. But *Aristotle* brings an experiment from a vessel of wax; for if one make a Ball of wax that is hollow, and shall dip it into the sea, it being of a sufficient thickness to contain, he shall finde it full of fresh water, because the corpulent saltness cannot get in through the pores of the wax. And *Pliny*, by letting down little nets into the sea, and hollow balls of wax, or empty vessels stopt, saith, they will draw in fresh water; for sea-water strain'd through clay will grow fresh. But I have found this to be false. For I have made pots of clay, as fine and well as I could, and let them down into salt-water, and after some days I found salt-water in them. Also, if it were true, it is of no use, when as to sweeten one pound of water, a thousand Balls of wax a day were not sufficient. But for this many vessels might be invented of porous wood and stones. A vessel of Ivy, that parts, as I said, wine from water, will not part salt from water if it drean through it. But stones are brought from Portingal, made into vessels, into which sea water put will drean forth sweet, if not the first, yet the second time, they use it to break the stone; also, for that many pumex and porous stones may be tried. *Leo Baptista Albertus* saith, That an earthen pot well stopt, and put into the sea, will fill with potable water. But I have tried all earthen vessels, and I always found salt-water. *Aristotle* in his *Problems*, saith, It may be done

Another way,

If salt-water cannot be drank cold, yet hot, and cool again, it is better to drink. It is because a thing useth to change from contrary to contrary, and salt-water is contrary to fresh, and when it is boil'd, the salt part is boil'd off, and when it is cold stays at the bottom. This I tried and found it false, and more salt, for by heat the thin vapors of the water that are sweet exhale, and the salt stay behinde; and in lesser water, the same quantity of salt makes it salter, as I said in my distillations. I wonder such a wise man would relate such falsities. *Florentinus* borrowing it from him, saith, If water be not good nor potable, but ill, let it be boiled, till a tenth part of it be consumed, then purge it, and it will be good, For sea-water so boil'd, will grow sweet. Let me see whether it can be made so

Another way,

and that in great quantity. There is a thing that being cast into large vessels filled with sea-water, by fastning the salt will make it fall to the bottom, or by curdling it, and so it frees the water from it. Wherefore we must think on things that have a stiptick quality, the Antients tried this, the Moderns have effected it. *Pliny*. *Nitrous* of bitter waters; if you put Barley-flower dried to them, they are tempered, that you may drink of them in two hours: therefore is Barley-flower put into wine sacks, and elswhere. Those that go to the Red-sea through the Desarts, make nitrous, and salt, and bitter waters fit to drink in two hours, by putting in of Barley-meal, and they eat Barley-meal. The like force hath the Chalk of the Rhodes, and our Clay. Also, Cooks with Catlings, and Meal of Wheat, will take salt out of very salt meat. I tried this oft but found it false, yet some of the saltness was taken away. *Pliny*. If you must drink ill waters, strew in powder of Penniroyal. *Leo Baptista Albertus*, when they take up the water of Nilus muddy, if they do but rub the edge of the vessel with an Almond, it presently grows clear: I tried this to, and found it false: when common salt is cast into *Aqua fortis*, that parts Gold from Silver, the Silver will presently descend. We see also, that in the making of that they call read Alac, casting but Alom into Lye, the salt and colour will presently precipitate to the bottom, and nothing will remain but clear water. We see that milk will curdle with many Herbs, which we speak of elsewhere. We shall use therefore for this purpose, coagulaters and astringents. Cooks say, That a Spunge put into a pot of salt-water, will draw the salt to it; but pressed forth again, and cast in once more will take it all out. So wood wrapt about with fillets of linnen, and put into the pot, will draw the salt to it. Others binde in a clout Wheat-meal, and put it into the pot, and draw forth the

the salt. *Palladius* where he speaks of seasoning of wines, saith, The Greeks bid men keep sea-water that is clean, and taken out of the calm sea the year before, whose Nature is that in this time, it will lose its saltness or bitterness, and smell sweet by age. It remains to shew

How sweet waters may be mended.

Leo Baptista saith, If you place a glazed vessel full of salt, and well stopt with lime, putting oyl under that no water may penetrate into it, that it may hang in the middle of the waters of a Cistern; these waters will in no time corrupt. Others adde also Quick-silver. If water begin to corrupt, cast in salt to purge them; and if salt be wanting, put in some sea-water, for so at Venice they draw water from St *Nicolas* Well, for Marriners that go long voyages, because it stands so neer the sea, and salt lyes hid in it, by communicating with those waters. We read in Scripture, that *Elizeus* did this, who at Jericho or Palestina, cast in salt into a Fountain, and made it potable water, which was before bitter and corrupt. If water breeds worms cast in quick Lime, and they will dye. When we would make wine clear, beat the white of an Egge, and the troubled wine will descend, if you put it in. Others cast in the dust that is on the catlings of small nuts, and the Spaniards cast in Gyp, to make it clear and all these we may use in waters.

CHAP. II.

How to make water of Air.

IF all other means fail, we may make water of air onely by changing it into air, as Nature doth; for she makes water of air or vapors: Therefore when we want, water we may make it of air, and do as Nature doth. We know when the Sun heats the earth, it draws forth the thinnest vapors, and carrieth them on high, to that region of the air where the cold is, those vapors are condensed into drops, and fall down in Rain. Also we see in summer, that in Glass vessels well rinced, and that are full of cold water, the air by coming to the outermost superficies, will presently clow'd the the Glass, and make it lose its cleanness; a little after it will be all in a dew and swell into bubbles, and by degrees these will turn to drops, and fall down, which have no other reason for them; but because the cold air sticking to the Glass, grows thick, and is changed into water. We see also in Chambers at Venice, where there windows are made of Glass, when a gross and thick vapor sticks to the Glass within, and a cold vapor prevails without, that within will turn to dew, and drop down. Again, in winter, in Brass Guns, which are always very cold, and are kept in Cellars, and vaulted places, where men also use to be, that the air will grow thick, and lighting upon the cold superficies of them, they will be all of a dew, and drop with water. But to say no more: Make a large round vessel of Brass, and put into it Salt-Peter, unrefined, what will fill it; men call it Solazzo mingled with Ice: for these two mixed, as I said in this Book, make a mighty cold, and by shaking them, with the wondeful force of the cold, they gather air about the vessel, and it will presently drop into a vessel underneath. A deligent Artist will adde more, that he may get a greater quantity of water. It sufficeth that I have shewed the way.

CHAP. III.

How one may so alter his face that not so much as his friends shall know him.

SUch as are taken prisoners, or shut up close and desire to escape, and such as do business for great men, as spies, and others that would not be known, it is of great moment for them to know how to change their Countenances: I will teach them to do it so exactly, that their friends and wives shall not know them. Great men do not a little enquire for such secrets, because those that can dissemble theirown persons, have done great matters, and lovers have served their Mistresses, and Parents have

have not suspected it. *Ulisses* attempting to know what the Trojans did, clothed in counterfeit garments, and his face changed, did all he would, and was not discovered. *Homer.*

With many scars he did transform his face,
In servants clothes, as from a beggars race.
He went to Troy, ———

And when he desired to know what *Penelope* and her suters did, he transformed himself again. I shall shew how this may be done many ways, by changing the Garments, Hair, Countenance, Scars, Swellings; we may so change our Faces, that in some places it may rise in bunches, in other places it may sink down. And first,

How to dye the Flesh.

But to begin with the colouring of the Flesh. The Flesh may be dyed to last so long, or to be soon washed out. If you will have it soon wash'd off, Steep the shells of Walnuts, and of Pomegranates in Vinegar, four or five days; then press them forth by a Press, and dye the face; for it will make your face as black as an Ethiopian, and this will last some days. Oyl of honey makes a yellow colour, and red, and it will last fourteen days or more. The fume of Brimstone will discolour the face, that it will shew sickly, as if one had long kept his bed, but it will be soon gone. But if you will have it last many days firm, and very hardly to come off: Use water of Depart, that seperates Gold from Silver, made of Salt-Peter and Vitriol, and especially if it have first corroded any Silver; this will last twenty days, until the skin be changed. But if you will

Change the Hair,

I taught elsewhere how to do this: yet I will take the pains to do it again. Oyl of honey dyes the Hair of the head and beard, of a yellow or red colour; and this will hold a moneth. But if they be hoary, white, or yellow, we may dye them black with a strong Lixivium, wherein Litharg is boiled. Also, it will notably alter the Countenance,

To adde or take off Hair,

An Unguent used in Stoves and Hot-houses, is good for that purpose, made of Orpiment and quick Lime; for this will presently make the part bald, so the eyelids and eyebrows being made smooth, will strangely metamorphise a man. We can also make the Hair grow suddenly, with water of honey, and the fat of an eel and horse, as I said. One may thus

Make his face swelled, pressed down, or full of scars,

Nothing doth more deform the visage then the stinging of Bees. We can make scars with caustick Herbs, by applying them, and letting them lye on for a little time. Tumours and Cavities are made by using to the part milk of Tithymal, as to the Mouth, Nose, Eyes, especially where the skin is off, that by this remedy alone the face is deformed; so you may do the Cods and Testicles: water of Cantharides smeered on, doth presently cause bladders and humours. Turbith beaten, and boiled, and anointed on, makes all swell where it toucheth, chiefly the Testicles. The powder of the Yew, doth so exulcerate the skin, that the people will think the man is most miserable, and in a sad condition. The remedy is the juyce of the Poplar, or the oyl of Poplar. The fume of Brimstone and burnt straw, will discolour the face, as Hypocrites do, who by such means alter their countenance. Mingle together the feces of *Aqua fortis* one ounce, Pickle and Curcuma, of each one drachm, with Oyl to the form of an unguent, and anoint your face, it will make it black. When you will wash it with cold water, it will come to its former complection. Comedians and Tragedians, when they Act on the Stage, they smeer their faces with lees of Oyl to change them, that such as are their acquantance may not know them. Because the stinging of Bees, Wasps, Hornets, do so change the face, making the Nose, Mouth,

and

and other parts to stand awry, and to be full of swellings and depressions: If any man wash his skin with the decoction of Hornets or Wasps, the place will so swell, that it will make men suspect some disease, yet it is without pain. The remedy is Theriot drank, or smeered on the part: and this is the fraud that false women use to counterfeit themselves to be with child. Beat together Oyl-lees, coles of a Vine and Pomegranate-Pills; and mingle them, and if you touch your face with this liniment, you shall make it exceeding black: but the juyce of sowre Grapes or Milk will wash it off.

CHAP. IV.

That stones may move alone.

THe Antients say, that the stones called Prochi[illegible] and Astroites, laid upon some other plain stone, will move of themselves, if you put Vinegar to them. The way shall be this: let a plain well polished, on the outward superficies, Porphyr Marble stone, lye beneath; lay upon this the stone Trochites or Astroites, whose outward superficies is made smooth also; then put to them a little vinegar or juyce of Lemons, presently of themselves will the Trochites, as well as the Astroites, without any thing moving them, go to the declining superficies: and it is very pleasant to see this. *Cardan* saith, That such stones have a thin moisture in them, which by the force of the vinegar, is turned into a vapor; and when it cannot get forth, it tumbles the stone up and down: There is the beginning of a thin vapor, but it comes not forth, because it is credible that the passages are very narrow: I should think that air is shut up in the veins of it, for it is probable, where you shall see substances of divers colours. Wherefore vinegar, because it is subtile of parts, goes in, and drives out the air, which passing out by the vinegar, moves the stone. Yet I have found that all stones will move themselves, that are mingled of divers stones, & ha[illegible] divers open passages in their veins. For the vinegar entring in at the joynts, forceth [illegible]he stone to move it self. The Alabaster stone, called vulgarly Lodognium, moves excellently, for it is distinguished by divers veins, and varieties of stones; and I have seen a piece, not onely of one poun[illegible] but of four pounds to move it self, and it was like a Tortois; and when the stone began to mov[illegible], it seemed like a Tortois crawling. That kinde of Marble moves by it self with vinegar, which is called Brocadello, which is compounded of divers and mingled [illegible]rts. Also with vinegar doth that spotted Marble walk, which is spotted with r[illegible], yellow, and brown spots; they call it the Lowsie stone, and it makes the beholders to wonder at it. I must tell you this before I leave off, because I would omit nothing. If the Marble be spotted underneath, and be above all of one colour and hard, or beneath all of one colour and hard, and above of divers colours; when vinegar is poured on, or any sharp liquor, it runs presently to the declining part; sometimes in circles, sometimes by jumps, and sometimes hastily moving it self.

CHAP. V.

How an Instrument may be made, that we may hear by it a great way.

IN my Opticks I shewed you Spectacles, wherewith one might see very far. Now I will try to make an Instrument, wherewith we may hear many miles; and I will search out a wood, wherewith that may be performed better and with more ease. Therefore to finde out the form of this Instrument, we must consider the ears of all living Creatures, that hear best. For this is confirmed in the Principles of Natural Philosophy, that when any new things are to be invented, Nature must be searched, and followed. Therefore to consider of Animals, that [illegible]ve the quickest hearing, we must think of those that are the most fearful; For Nature takes care for their safety, that as they have no great strength, yet they might exceed others in hearing, and save themselves by flight; as the Hare, Coney, Hart, the Ass, Ox, and the like. These

Creatures

Creatures have great ears, and always open toward their foreheads; and the open passages are to carry the sound from the place whence it comes. Hares therefore have long ears standing up high. *Pollux*. But *Festus* calls the Hare, *Auritum*, because of its great ears, and quickness of hearing. The Greeks call the Hare *Lagos* from the great ears; for *La* in composition augments, and *Os* signifies an ear, and it was fit that a fearful creature should hear well, that it might perceive dangers farther off, and take care for it self in time. The Egyptians thought the Hare so quick of hearing, that it was their Hieroglyphick for hearing. The Coney is of the same Nature, and hath the same kinde of ears. Cows have great hairy ears: she can hear a Bull rore when he seeks to Bull a Cow, thirty furlongs off, as giving this token of his love. *Ælian*. A Hart hath greater and longer ears, as it is a fearful Creature: If he holds his ears right up, he perceives sharply, and no snares can take him; but if he let his ears down, he is easily slain. *Aristotle*, and *Pliny* from him. When they raise their ears, they hear quickly; when they let them fall, they are afraid: and not to go over all Creatures that have large right up open ears, I say those that have such ears, they raise them and direct them forward, when they would hear afar off, and they are of most perfect hearing. I shall shew now by the contrary, that such Creatures which have short small ears, and not so visible, are of dull hearing. Great part of Fishes want ears, and such as have onely holes and no ears, must needs hear more deafly; for the outward ears are made by Nature, that the sounds might be conveyed to the ears by them. *Adrianus* Consul of Rome, is a most clear witness of this, who having this sense hurt, made hollow catches to hear better by; and these he fastned to his ears, looking forward. And *Aristotle* saith, That Horses, Asses, Dogs, and other Creatures that have great ears, do always stir them about, and turn them to hear noise, Nature teaching them the use of those parts; and we finde that they hear less that have their ears cut off: wherefore it is fit, that the Form of the Instrument for hearing, be large, hollow, and open, and with screws inwardly. For the first, if the sound should come in directly, it would hurt the sence; for the second, the voice coming in by windings, is beaten by the turnings in the ears, and is thereby multiplied, as we see in an Eccho. The sea-Periwinkle is an argument to prove it, which being held to the eare makes a light noise. Now it remains to speak of what matter it must be made. I think of porous Wood, for the holes and pores are passable every way; and being filled with air, they sound with every small stroke: and amongst the porous Wood, is the Ivy, and especially the tree called Smilax or Woodbind, for a Dish made with Ivy, will let out the water, as I said. Wherefore *Pliny* speaking of the Woodbind, saith, It is proper to this matter, that being set to the ears, it will make a small noise. And in another place, I said that the Woodbind-Ivy would sound, if set to the ear. Therefore fit your Instrument to put into your ear, as Spectacles are fitted to the eyes.

Chap. VI.

How by some Impostures we may augment weight.

I Have set down some Impostures here, that such as handle with wicked men, may take heed that they be not deceived. As

To augment the weight of Oyl,

water is mingled with the Oyl, that the fraud may not be known, let it be done with troubled waters, as with the decoction of Wood, Rapes, Asphodills, that it may the harder be discerned from it. Or else they put the choisest Gumtragant into water for two days: then they bray it in a Mortar, always putting water to it, to melt the Gum: adde these to the Oyl dropping forth, and they will be turn'd to Oyl. By the like fraud almost,

Silk is made to weigh more,

They put it upon the vapour that riseth from boiling water, and this makes it swell with moisture, and grow heavier. Others bray one ounce of Gum Arabick, and being

ing well passed through a sieve, they mingle it with the decoction of Honey; they dissolve this mixture into water, and wet the Silk with it, and then let it dry. Others keep it in the green leaves of Walnut-tree. If you will

Increase the quantity of Honey,

Adde to it the Meal of Chestnuts of Millet, and that augments it, and it cannot be known. So you may

Increase the weight of Wax:

Adde to the Wax Bean-meal, excellent well beaten; and this will burn in Candles without any excrement; for it increaseth the weight and bigness, and the fraud is scarce discerned. So you may

Augment Sope.

If you mingle the Ashes of Oxens shank-bones, well burnt it Potters ovens, or white Brimstone. For you shall augment the weight and quantity, without and distinction of it. If you would

Counterfeit Pepper,

You may gather green Juniper-berries, and let them dry till they shrivel; then mix them with grains of Pepper. Others gather great black Vetches, and first they boil them with wilde Pepper; for swelling in the water, when they come to be dried, they become wrinkled. I did sophisticate them so, that I deceived in sport the best Apothecaries; and afterwards, I did in mirth discover the fraud. Take the Berries of the ripe red Sanguinaria; these when they are dried, will be so shriveled, and like to Pepper, that any man almost may be deceived by it, unless he tasts of it. So we may

Increase the weight of Wheat,

By setting a vessel of Wood within it, full of water or vinegar. For as *Pliny* saith, It will drink it in.

Chap. VII.

Of the Harp and many wonderful properties thereof.

THe Harp hath some properties in it, and things worthy to be observed, which I shall propound here. First, I shall mention some wonderful effects, that the Antients speak of: then how they may be done, or how the Antients did then. Since Musick is now more Adorned and Noble, than it was amongst the Antients (for then it was more rude and imperfect) and yet in our days it doth not perform those operations. It is certain that Musical Tunes can do much with men, and there is no heart so hard and cruel, but convenient and sweet harmony will make it yield, and on the otherside, harsh Musick will vex and harden a mans minde. *Musæus* discovers, that Verse and Songs are a most delightful thing to Mortal man: and the Platonists say, That all things living are charmed by Musick; and there are many effects observed of it. Drums sound in the wars to provoke those that are slow to fight; and we read that the Antients did such like things. One *Timotheus* a Musician, as oft he he pleased would play a Phrygian Tune, and so enrage the mind of *Alexander*, that he ran presently to the wars; and when he would do otherwise, he changed his tune, and took off all his courage making him lasie, and would then draw him being grown effeminate, to Banquets and Feasts: And *Plutarch* saith, That when he heard *Antigenida* playing Melodies with a Pipe, that they called Harmatii, he was so inflamed, that he rose in his Arms, and laid hold of him that sat next to him. *Cicero* reports, That *Pythagoras* made a yong man more calm by a slower tune, who was a Tancomonite, and was whitled with wine, and mad for a whore, and spurred forward by a Phrygian tune; for being a corrival, he sought to set the house on fire

where

where the whore was. And the same Author saith, If yong men are provoked by the sound of Flutes to commit any wickedness, if the Piper play but a slower tune they are called off again; for by the gravity of the Musick their petulant fury is alayed. *Empedocles*, when one set upon his Host, that provoked him with reproaches and ill language turned the burden of his Song, and so asswaged the fury of his anger. *Theophrastus* is reported to have used Musical Tunes to repress the passions of the minde. And *Agamemnon* departing from his Country to go to Troy, doubting of the chastity of *Clitemnestra*, left a Harper, who with Musick did so incite her to continency and chastity, that *Egystus* could not enjoy her till he had killed the Harper. The *Thracian Orpheus* by the playing on his Harp, made barborous Nations civil who were as hard as stones to be softned. Musick charms the tender ears of children, and Rattles will make them quiet, and hold their peace when they cry. Wherefore *Chrysippus* is reported to have written a peculiar Song for Nurses. Also wilde Beasts are tamed with Musical Tunes. *Arion* the Harper made friends of the Dolphins that want reason, and they carried him safe to the shore, when he was cast into the Sea. *Strabo* saith, That Elephants are allured with drums. Stags are held with sounds, and catched with sweet Musick. The Swans under the North-winde are conquered by the Harp and Musical Tunes: Little birds are enticed to the Net with Pipes; and the Shepherds Pipe commands the Sheep, when they wander too far to field, to stand still. In Mysia, when Horses back Mares, a man sings to them as it were a marriage Song, and the Mares are so taken with the Musick, that they become great with Fole, and they bring forth most gallant Colts. *Pythocaris* a Musician, when he sang earnestly swift Notes to his Pipe, is said to have made Wolves become more tame; and which is far more wonderful, Antiquity cured Wounds, Diseases, and Poysons by Melody, as Histories related. *Terpander* and *Aaron* of Methymna, cured the men of Lesbos and Jonia of great Diseases. *Asclepiades* a Physitian cured deaf people by a Trumpet, and by singing he stilled the seditious people. In time past there was great store of Spiders in Aquilia, which they commonly call Tarantulæ, when the Sun is extreme hot they bite most pestilently, and venemously; for this danger this healthful remedy is onely found out, that he that is bit must be charmed with much singing of Musicians, and many musical Instruments. The sick though he want all sense, so soon as he hears the Flute play, as if he rose from a dead sleep, ariseth from the earth, and danceth after the Musick; and if the Musician cease to play, he presently faints, & grows stupedt and as the Musick strikes up, so he doth dance the more. So to several Diseases the Antients appointed several Musick; for the Dorick Melody caused Prudence, Chastity, and Learning; the Phrygians made men fight, and grow furious, which the flute will do also. Therefore *Aristoxenus* in his Plays, when he could not prevail with Dorick Musick, he changed to Phrygian melody that agreed with them. The Lydian Harmony sharpens wit to those that are dull, and brings in a desire of heavenly things, upon those that are oppressed with a love of earthly things. *Aristotle* in his *Politicks*, Do we not reade that the Lacedemonians rejected that kinde of Musick called Chromaticum, because it made those that heard it too effeminate? Whence I think it is not against reason, that the same may be done by the Lute or Harp alone, but what is done by art or cunning, is more to be wondred at, which none can deny. But if we would seek out the cause of this, we shall not ascribe it to the Musick, but to the Instrument, and the wood they are made of, and to the skins; since the properties of dead beasts are preserved in their parts, and of Trees cut up in their wood, as I said elsewhere in this Book. And to take the most noted examples, if we will

Fright Sheep,

There is Antipathy between Sheep and Wolves, as I said often, and it remains in all their parts; so that an Instrument strung with Sheep strings, mingled with strings made of a Wolfs guts, will make no Musick, but jar, and make all discords. *Pythagoras.* If you will

Drive away Horses,

Horses are frighted in battle by Elephants, and a Camel Naturally hates a Horse, as

Aristotle and *Pliny* say, and some report that Horses will burst if they tread upon the Wolfs footing, when the Horsemen rides them. So that if drums be made of an Elephant, Camel, or Wolves skin, and one beat them, the Horses will run away and dare not stand. By the same reason, if you will

Drive away Bears,

A Horse, that is a Creature made obedient to man, hath a Capital hatred with a Bear, that is a Beast hurtful to man; he will know his enemy that he never saw before, and presently provide himself to fight with him, and he useth art rather than strength for it; and I have heard that Bears have been driven away in the Wilderness by the sound of a Drum, when it was made of a Horse skin. Again, if we would

Make Horses gentle,

Ælian writes that by the playing on a Flute, the Lybian Horses are so allured, that by this means they will become gentle for mans use, and will not be so furious; they will follow the Groom that feeds them, whithersoever he please to lead them with his Musick; when he plays and stands, they stand still, and if he play eagerly on the Flute, they are so ravished with it, that they cannot hold crying, and let tears fall. Those that keep Horses make a hollow pipe of the Tree called Rose-Laurel, and they go amongst the herd with this, and playing on it they charm them all. *Theophrastus* hath told us that the Herb Oenothera will tame wilde Beasts, and make them drunk; and as I said elsewhere, *Theophrastus* his Oenothera is our Rose-Laurel, against *Dioscorides*. It is reported, that

Women will miscarry,

if Fiddle-strings be made of Serpents, especially of Vipers, for being put on a Harp and play'd on, if women with childe be present, they suffer abortion, and Vipers are wont to do as much by meeting them, as many write. *Hermenias*, a Theban, endeavoured

To cure many of the Sciatica

in Beotia, by Musick; and it may be his Instrument was made of Poplar, for *Dioscorides* saith, That the juyce of the Poplar-tree-bark will cure them, or of Willow. Also Hellebore is good

For mad men

And *Xenocrates* cured mad men with Musical tunes, which Instruments might be easily made of Horses Shank-bones, or the hollow stalks of Hellebore. *Thales Milerius* used a Harp

Against the Plague,

which could be of no other Wood than the Vine-tree; since Wine and Vinegar are wonderful good against the Pestilence, or else of the Bay-tree, whose leaves bruised and smelled to, will presently drive away Pestilent contagion. *Theophrastus* writes that some are excellent

Against the bitings of Vipers,

with Harps, Flutes, or other Instruments, which Instruments might be made of Juniper, Ash, Bays, the Stags-bones, Ferula, Elder, Vine, and such like many more. *Pythagoras*

Against Drunkenness

used Musick also: for he withheld a yong man that was drunk from burning the house of his corrival, may be with an Instrument of Ivy, or Almond-tree-wood, especially that as it is of the wilde Tree, for these afford great remedy for drunkenness. *Timotheus* did so enflame the minde of *Alexander* the Great, that he was mad to fight, and when he would he changed his minde, and drew out all his courage; and he endeavoured

To

To draw his sluggish and yielding thoughts from Battle to Banquets,

and so carried him which way he pleased, which could not be done, but by Vine-wood, or Wood-Laurel. The Instrument of the Harper, who when *Agamemnon* went from Greece to Troy, did keep *Clilemnestra* chaste by, his Musick was made of Willow, called *Agnus Castus*; for the women in the Feasts of *Ceres*, amongst the Athenians, put Willow-Park-leaves under them, to keep them chaste when they lay in bed, for so they extinguished the desire of venery. The Pythagoreans used some Tunes

For sleep and waking;

For when they would by sleep overcome divers cares, they play'd certain Tunes, that easie and quiet sleep might come upon them; and when they arose, so soon as they went out of their Chambers, with some Musick they would dispel all confusion and dulness of sleep, that they might set to their work. It is said that the Æolian Musick doth still the tempests of the minde, and rocks men a sleep: they provoked men to sleep with Almond-tree, or Vine-tree-wood, and they drove sleep off with Hellebore. Take this experiment that is common,

A Harp that is play'd on, will move another Harp strung to the same height.

Let the strings be stretched alike, that both may come to the same melody perfectly; if you shall strike one of the base strings, the other will answer it, and so it is in the trebles, yet they must be at a moderate distance; and if this be not very clear, lay straw upon it, and you shall see it move. But *Suetonius Tranquillus*, in his Book, *De Ludicra Historia* saith, That in Winter some strings are struck, and others sound. Thus any ignorant man may tune a Harp, if one Harp be rightly tuned for Musick, and lye still, he by stretching the strings of the other, and by slackning them, and striking as the string of the Harp that lyes still guides him; so of the rest, But if you will

That a deaf person may hear the sound of the Harp,

or else stop your ears with your hands, that you may not hear the sound. Then take fast hold of the Instrument by the handle with your teeth, and let another strike on it, and it will make a Musical noise in the brain, and may be a sweeter noise. And not onely taking hold of the handle with your teeth, but the long neck, neer the Harp, and by that you shall hear the sound perfectly, that you may say that you did not hear the Musick, but taste it. Now remains what I think is very pleasant

To make a Harp or other Instrument be play'd on by the winde,

Do thus: When the windes are very tempestuous set your Instruments just against it, as Harps, Flutes, Dulcimers, Pipes the wind will run violently into them, and play low upon them, and will run into the holes of the reeds; whence if you stand neer and listen, you will hear most pleasant Musick by consent of them all, and will rejoyce.

Chap. VIII.

To discover Frauds whereby Impostors working by Natural means, pretend that they do them by conjuration.

Now will I open Cheats and Impostors, whereby Jugglers and Impostors, who fain themselves to be Cujurers, and thereby delude fools, knaves, and simple women. I, to cast down their fraud, by admonishing simple people not to be deceived by them, shall open the causes thereof. And first,

By what means they fain, that they can discover Treasures,

The greater part of Cozners, when they are themselves very poor and most miserable of all men, they profess themselves able to finde out Treasures, and they promise to other men what they want themselves; and they use four Rods that are double forked, the tops whereof sticking close together crossways, they hold the lower parts

of

of them with their hands open, neer their belly, they seem to mumble some Verses, and the Rods fall down, and where they fall, they bid those men to dig that would find Treasures. The cause is, for that the Rods seem to stand fast in their hands, and yet have no hold at all, and they seem always ready to fall; and if they remove never so little from their place, they presently fall down. Also, there are in mens arms and hands pulsations of Arteries, which although they seem immovable, yet they do move the hands unseen, and make them to tremble: Yet some Metal-Masters who report that these forked Rods are a great help to them in finding out of Mines: For with a Knife they cut the Hazel-tree, which they say is the fittest of all to finde out Veins, especially if the Hazel come upon any Mineral Vein. Others use divers Trees, as the Metals are divers; for they use wands of Hazel for Veins of Silver, Ash for Brass, Wilde Pilch-tree for Lead, chiefly white-Lead, or Brass, or Gold: then they take the Rod by both ends, and clinch their fists, but they must hold their fingers clinched upwards toward heaven; and that the Rod may be lifted up there where the ends meet, thus they wander here and there through Mountainous places, and when they set their foot upon a Vein, the Rod will presently turn about, and discover a Vein in any place; when they come off from it, the Rod will be quiet, and they say the Veins have so great force, that they will bend the Boughs of Trees that grew neer, towards them, as *Agricola* writes more largely.

Another merry conceit remains, that three Schroles of Paper not touched, shall change their places.

This cannot be done but an ignorant man will admire it. Make three long Schroles of Paper, or of linen, and let them be one longer then another, equally; for all of them being made equal at the lower end, and turn'd about equally, they take one the others place, and change their situation; put the longest in the middle or in the first place, they change their situation; if the longest be put last, they hold as they were. No man but will think this to be done by the Divel, yet this proceeds from no other cause, but because in the end of the revolution, the longer remains, and the last from whence it riseth stays behinde. *Aristotle* in his Problems seems to mean this, why the Section of a Paper, if any man cut it off straight from the plain basis in measuring, it will be straight when it is turned about; but if it be bended, it will be twisted? whether this falls out, that when the rounds of another Section are placed on the same plain, that Section declining, is not equally opposite, but somewhat less: wherefore when you part them, those rounds that are contain'd in the same plain, will make a line, that belongs to their own order, *&c.* Some were deceived, who thought this proceeded from the force of words, and they answered all questions by it as from an Oracle: for if they changed their places, all should go well and prosper, otherwise they should have ill success; and they would not change their superstitious belief, with reason and experience, because they had so believed many years. If you will have

Money to turn about upon a point,

I oft have seen Impostors that to cheat women used this fraud, that two Schroles of Paper, or some other light matter upon a plain, should lift up themselves, and move alone. If you search in Barley, you shall finde a small ear of wilde Oates, that is black and wrested, like the foot of a Locust; and if you binde this with wax to the top of a Knife, or point of a Stile, and shall sprinkle softly some drops of water upon them, when it feels the wet, it will twist like a Harp string, and the Paper will rise, and so will Money turn on the point of a Stile. If we will

Discover theft,

we may do it thus, and recover what is lost. There are many superstitions for theft, that stand by Natural reasons; and Cheaters ascribe them to the vertue of Words. There is the Eagle stone, so called, it is as one great with childe; for shake the stone, and it rings in the belly: If then any one powder this, and put it into good bread baked upon the Embers, and give it to a Thief, the Thief cannot swallow it, when

he

he hath chewed it, but he must either be choked, or discovered for a Thief; for he cannot swallow it being baked with that, as *Dioscorides* saith. The Natural cause for this is, because the powder that is mingled with the bread is so dry, that it makes the bread extream dry, and like a pumish, that it cannot be swallowed, when it comes into the throat. Adde to this, that he who seeks to finde a Thief, must say to the standers by, whom he suspects that he will work wonders; whereupon he that is the Thief, hath his throat very dry, by reason of the fear and terrour he is in; so that he cannot swallow this bread with the powder in it, for it will stick to his throat; for if he were void of fear he could scarce swallow it. There is another cunning invention: they write the names of those that are suspected upon Schroles of Paper, and make them fast in clay bullets, and put them under the water, the pellets being well wet, open, and the light schroles of Paper rise above the water. And this causeth the spectators to admire, and to suppose it is some diabolical art. The clay pellets are made as many as the standers by are, and the names writ in the schroles, are wrapt up in the pellets: for the schroles that are not very fast wrapt in the pellets, are not very fast bound in; but if you will have them never to open, you shall work it well with the schrole, and so it will never come forth. If you will have

Flowers to fall from a Tree:

When I saw this first I was amazed, but I asked the reason, and he shewed me it. It is a property of Mullens, that when in the morning it opens the Flowers, if the Plant be shaken gently, the Flowers drying by degrees will fall all to the ground; and one that sees it will think it comes from Magical Art, if he that shakes them off shall mumble some idle words. Also,

Women are made to cast off their clothes and go naked:

To let nothing pass that Jugglers and Impostors counterfeit, They set a Lamp with Characters graved upon it, and filled with Hares fat; then they mumble forth some words, and light it; when it burns in the middle of womens company, it constrains them all to cast off their clothes, and voluntarily to shew themselves naked unto men; they behold all their privities, that otherwise would be covered, and the women will never leave dancing so long as the Lamp burns: and this was related to me by men of credit. I believe this effect can come from nothing but the Hares fat, the force whereof perhaps is venemous, and penetrating the brain, moves them to this madness. *Homer* saith, The Massagetæ did the like, and that there are Trees whose fruit cast into the fire, will make all that are neer to be drunk and foolish; for they will presently rise from their seats, and fall to leaping and dancing. There are Thieves also

Who bore through the head of a Pullet with an Aule, and yet maintain that she is alive.

And they say it is done by conjuration, and they promise to make a man hard by this, that he cannot be wounded; for with some Characters fraudulently invented and bound under the wings, they thrust through the head of the Cock with a Bodkin, and staying awhile, they pull it forth again, and the Pullet flies away without any wound, or loss of blood. When I considered of this, and opened the Pullets head, I found it to be parted in the middle, and the Knife or Bodkin passing through that place, hurts not the brain, and I have often tried it, and found it true. There is also

A remedy for the Sciatica,

Great *Cato*, the chief man for all commodity, and the Master of all good Arts, as *Pliny* saith, In his Books of Husbandry he used some charms against the pains of the Sciatica, saying, that if any thing be dislocated, you may charm it whole again by this means. Take a green Reed four or five foot long, cut it in the middle, and let two men hold them to the huclebones. Begin to play with another, S. F. *motas veta daries dardaries astataries dissunapiter*, until such time as they joyn together, and shake about your sword, when they come together, and one toucheth the other, take that

that in your right hand, and cut it asunder with your left; bind it to the place dislocated or broken, and it will be whole. See how so worthy a learned man brake forth into such madness; nor did he know by his great learning, that without the force of Words, green Reeds cut long-ways, will turn round of themselves and meet, if they be pendulous, as the wands of Willows, and brambles will do. *Theophrastus* gives the reason why they turn round, in his Books *De Causis Plantarum*. Moreover we reade in *Dioscorides*, that a Reed with Vinegar applied to the hucklebones will cure the Luxation of the loins, without words or superstition.

CHAP. IX.

Of some Experiments of a Lamp.

I Much rejoyced when I found amongst the Ancients, that *Anaxilaus* the Philosopher, was wont to make sport with the Snuff of a Candle and the Wick, and by such delusions would make mens heads shew like Monsters, if we may believe *Pliny*: By taking the venomous matter comes from Mares newly having taken Horse, and burning in new Lamps, for it will make mens heads seem like Horsheads, and such like: but because I gave no credit to these things, I never cared to try them. But take these for truth.

To make men seem like to Blackmores,

Take Ink, but the best comes from Cutles: mingle this with your Lamps, and the flame will be black. *Anaxilaus* is reported to have done this, for oft-times by mingling Cutles Ink, he made the standers by as black as Ethiopians. *Simeon Sethi* saith, That if any man shall dip a Wick in Cutles Ink, and Verdigrease, those that stand by will seem partly Brass-colour, partly Black, by reason of the mixture. And we may imitate this in all colours; for setting aside all other lights that might hinder it, for else the other lights will spoil the sport, and if you do it by day, shut the windows lest the light come in there and destroy the delusion. If the Lamp be green Glass and transparent, that the rays coming through may be dyed by the colour of the medium (which is of great consequence in this) and green Coppras be mingled with the Oyl, or what moysture it burns with, and they be well ground together, that the liquor may be green; make your Cotten of some linnen of the same colour, or bombast; this being smeered with it, must burn in that Lamp: the light that is opposite against you, will shew all faces of the beholders and other things to be green.

To make the face seem extream pale and lean,

This is easie; pour into a large Glass very old Wine, or Greek Wine, and cast a handful of Salt into it: set the Glass upon burning coles without flame, lest the Glass should break, it will presently boil; put a Candle to it, and light it; then put out all other lights, and it will make the faces of the standers by to be such, that they will be one afraid of another. The same falls out in shops, where Bells and Metals are melted, for they seem so strangely coloured in the dark, that you would wonder at it, their lips look pale, wan, and black, and blew: Also let Brimstone, when it burns, be set in the middle of the company, and it will do the same more powerfully. *Anaxilaus* the Philosopher was wont to work by such delusions. For Brimstone put into a new cup, and set on fire, and carried about, by the repercussion of it when it burns, makes the company look pale and terrible. That oft-times happened to me when at Naples I walked in the night in the Leucogean Mountains; for the Brimstone burning of it self, made me look so.

CHAP. X.
Of some mechanical Experiments.

THere are some Experiments that are witty and not to be despised, and are done by Simples without mixture, which I thought not unfit to communicate to ingenuous Men, and Artificers. There is an Art, called

The flying Dragon,

or the Comet: It is made thus; Make a quadrangle of the small pieces of Reeds, that the length may be to the breadth, one and half inproportion; put in two Diameters on the opposite parts, or Angles, where they cut one the other, bind it with a small cord, and of the same bigness, let it be joyned with two others that proceed from the heads of the Engine. Then cover it with paper or thin linnen, that there be no burden to weigh upon it: then from the top of a Tower, or some high place, send it out where the wind is equal and uniform, not in to great winds, lest they break the workmanship, nor yet to small, for if the wind be still, it will not carry it up, and the weak wind makes it less labour. Let it not flye right forth, but obliquely, which is effected by a cord that comes from one end to the other, and by the long tale which you shall make of cords of equal distance, and papers tied unto them: so being gently let forth, it is to be guided by the Artificers hand, who must not move it idly or sluggishly, but forcibly; so this flying Sayle flies into the air. When it is raised a little (for here the wind is broken by the windings of the houses) you can hardly guide it, or hold it with your hands. Some place a Lanthorn upon it, that it may shew like a Comet: others put a Cracker of paper, wherein Gun-powder is roled, and when it is in the air, by the cord there is sent in a light match, by a ring or some thing that will abide; this presently flies to the Sayle, and gives fire to the mouth of it, and the Engine with a thundring noise, flies into many parts, and falls to the ground. Others bind a Cat or Whelp, and so they hear cries in the air. Hence may an ingenuous Man take occasion, to consider how to make a man flye, by huge wings bound to his elbows and breast; but he must from his childhood, by degrees, use to move them, always in a higher place. If any man think this a wonder, let him consider what is reported, that *Archytas* the Pythagorean did. For many of the Noble Greeks, and *Favorinus* the Philosopher, the greatest searcher out of Antiquities, have Written affirmatively, that the frame of a Pigeon made in wood, was formed by *Archytas*, by some art, and made to flie; it was so balanced in the air by weights, and moved by an aireal Spirit shut within it.

Soli Deo Gloria.

FINIS.

A TABLE containing the General Heads of NATURAL MAGICK.

The first Book;

Treating of wonderful things.

Chap

VVHat is meant by the name, Magick 1
The Nature of Magick 2
Instruction of a Magitian, what he ought to be 3
Opinions of the Ancient Philosophers touching the causes of strange operations, and first of the Elements 4
Divers operations of Nature, proceed from the essential forms of things 5
Whence the form cometh: of the Chain that Homer *faigned, and the Ring that* Plato *mentioneth* 6
Sympathy and Antipathy, by them to finde the vertues of things 7
From Heaven and the Stars things receive their force, and thereby many things are wrought 8
How to *Attract the vertues of superior Bodies* 9
Knowledge of secrets dependeth upon the survey of the World 10
Likeness of things sheweth their secret vertues 11
Compound things by their likeness 12
Particular creatures have particular gifts; some in their whole body, others in their parts 13
Properties of things while they live, and after death 14
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Where they grow, chiefly to be considered 16
Properties of Places and Fountains commodious for this work 17
Compounds work more forceably; and how to compound and mix those simples which we would use in our mixtures 18
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Earthy Creatures generated of putrefaction 2
Birds which are generated of the putrefaction of Plants 3
Fishes which are generated of putrefaction 4
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Dogs may be generated of great courage, and with divers rare properties 6
Pretty little dogs to play with 7
Amend the defects in dogs. 8
Divers kinds of Mules 9
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Divers kindes of Birds generated by divers Birds coupling together 13
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New and strange Monsters 17
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seasons 8
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Fruit produced without any rines or shels 13
Colours such as are not incident to their kinde 14
Colours of Flowers may be changed 15
Fruits and Flowers may be changed to a better savour then ordinary 16
Fruits to be sweeter and pleasenter for tast 17
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Fruits and Vines planted that may yield greatest encrease 21

The fourth Book;

The increasing of Houshold Stuffe.

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Time to be chosen for preserving such fruits as you lay instore for a great while 4
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